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Cut Glass Association Meets in Convention

Action of Members in Adopting an "Association Label" Believed to Mark the Beginning of a New Epoch in the Marketing of Cut Crystal Glass

By E. H. BENNETT

A most momentous meeting of the National Cut Glass Manufacturers' Association of the United States took place in Montreal, Canada, July 11, at the Windsor Hotel.

It seems certain that the final action taken at this meeting in adopting an "Association Label" will revolutionize the sale of cut crystal glassware and cause many manufacturers, who have not hitherto taken the Association seriously, to open their eyes.

During the past three or four years much talk and some action has taken place regarding the adoption of a label or hall-mark to be placed upon each piece of cut crystal glass. This identifying mark is to be a guarantee that all ware bearing it is made according to the accepted method and rules laid down in an agreement signed by certain manufacturers, members of the Association.

This hall-mark has been copyrighted, patented and protected in every possible manner and its use will be protected by every means known in the United States courts.

That cut crystal glass bearing the label will be popular with buyers is an assured fact, for many have withheld placing large orders until they can get merchandise with the hall-mark thereon. Others have assured manufacturers that when the labeled goods are ready for the market, none but such items shall find a place on their shelves. The public will be acquainted with this radical action on the part of the good cut crystal glass makers, by means of national advertising, circulars and small advertising cards for display in store windows and on show cases where cut crystal glass is shown.

The National Association has done a great deal to hold the cut glass industry together. For the past ten years the trade has suffered serious blows, many of which it is to blame for itself, though in other ways it has been the victim of circumstances.

Many have stated that the introduction of the figured blank was responsible for the first setback cut glass suffered, but honest cutters know that had the figured blank been treated in the same manner as a roughed plain blank, the industry would never have descended to the level that it did, nor would it have been necessary to take the drastic measures now about to become operative.

The introduction of the figured blank opened up to a certain class of unscrupulous manufacturers an avenue for questionable trading which would show large profits and tremendous volume of business. Some portions of the pressed-in patterns were not cut at all; they were simply dipped in the acid; not even buffed, and the only justification they had for calling the finished article cut glass was first, that it had a flower, usually a daisy cut or scratched on it, and second, that it was glass.

The cutting or scratching of the flower was done with a stone that had a series of V's cut into it, so that with one slight touch a petal of the flower was accomplished, and six such touches made a complete flower, with a touch of a smooth stone for the center. Others would run the corrugated stone right across three times so that a six petal flower would be made complete with a center with only three actions. This was the excuse for calling the finished article cut glass. The foliage of the flowers was simply a pressed design that had been acid polished.

The glass upon which the work was done could not by any means be called "crystal" as it was always off color with a brown, yellow or green tinge.

Technically they could call it "cut glass" but under the generally accepted term it was no more cut glass than chalk is cheese.

The very unfortunate result of this kind of merchandise and its method of sale is that it has made a lot of dishonest retailers, or rather given dishonest merchants an additional opportunity of exercising their thieving minds in duping the public who are uninitiated.

The other day a leading "honest-to-goodness" cut crystal

manufacturer went to a store in a large city and spotted a display of the class of ware described above and inquired the price. During the interview the saleslady did her utmost to convince him that the goods were genuine cut glass and that it was "cut all over." This, she assured the would-be purchaser, was "positively cut glass" and she would bring the manager to substantiate her word. An ordinary woman purchaser not well informed on the process of manufacture would have been deceived by such insistence, but had she known that there was a label or acid mark placed only on "genuine cut crystal" she could easily have convinced herself as to the genuineness of the piece.

The figured blank undoubtedly led to a great deal of unnecessary price cutting with the usual slighting of work. Even when all the scallops and other portions of the pattern were cut over, smoothing and buffing were neglected and the work done in a slovenly manner in order to turn the work out quickly at a price.

Unheard of orders were taken for vases, fern dishes and bowls in lots of one, five or ten thousand, for premium purposes. Such orders were only secured after severe competition in prices and manufacturers were prone to give prices that for the majority would spell ruin and have proved the eventual undoing of the firms undertaking the business. Besides bringing ruin to themselves they have been guilty of debauching a high-class commodity that might be regarded as a luxury, although a necessity to many, and reduced it to a level to which it should never have descended.

Other causes for the condition of the business during the past few years have been unavoidable. The war made it impossible to secure potash and other ingredients necessary for making a glass of crystal purity. Substitutes were used with the natural result that poor ware was offered the market, which again gave it a setback.

A really serious cause has been claimed by reputable glass cutters against the blank manufacturers themselves, in the casual way in which they will supply blanks to itinerant cutters, whose credit is most questionable and whose practices as manufacturers are not according to the acceptable methods of business men. When pinched for money for wages or to meet a blank makers' note they will offer goods to merchants or jobbers at prices that distinctly show a loss, eliminating overhead or wear and tear entirely. It was possible for a man with fifty or a hundred dollars to become a cut glass manufacturer and secure credit for blanks to start him in business. This has done incalculable harm to the industry and is now reacting on the blank makers themselves.

All these things, together with the general let-down of business after the war, has not been encouraging to the good crystal glass cutter. Still he has continued his organization, held his industry together and in spite of opposition is putting into operation a usage that will do more to improve the situation than anything else. It is a movement that emphasizes good merchandise, guaranteed, for a reasonable price, and it is a policy that is sure to win.

Label for Cut Glass adopted by the National Association of Cut Glass Manufacturers of America.

"In spite of opposition": It is wondered, perhaps, why there should be opposition to such a movement, and it may astound some that a few of the reliable glass cutters are very cool to the plan and although willing to do anything to help the industry, hardly feeling like adopting the label.

The reason, too, is understandable, if at the same time exaggerated in importance. The claim is that for years they have been putting the best work possible in their goods and have built a name and a trade-mark for themselves without having had to sign any agreement compelling them to put a certain minimum amount of work on the blanks, while some of the firms, signatories to the agreement, will have to raise their standard of work and will probably put only the minimum amount of work on the goods so that they can skimp through an inspection. There is considerable force to this argument, but if the reputable firms will take a broader viewpoint and look upon the movement as one to uplift the industry and reinstate it in the minds of the public so that cut crystal glassware will be regarded with greater favor they must, of necessity, receive great benefits thereby.

Then if the public does become familiar with the cut crystal hall-mark there are those who are unable to distinguish imitation from the genuine and will refuse to buy a single piece of cut crystal that does not bear the insignia, and there are buyers who will realize this and for this reason will not stock any but that bearing the new label. Therefore, even though a manufacturer has made his own trade-mark and good quality synonymous, it would seem but common sense that he should also add to his own mark that of the Association, thus making assurance doubly sure. On the goods that are wrapped up a label will be applied to each parcel, and on each piece itself prior to wrapping will be stamped an acid etching of the new Association hall-mark.

A reproduction of the label is shown here. In the center will be noticed a figure "3." The number indicates the factory responsible for the ware. Each firm using the labels is assigned an identifying number so that the ware can immediately be placed as coming from certain factories. Number three is the first batch of labels printed and the one which was finally and authoritatively passed by the Association when in convention at Montreal and in compliment to R. A. May of the Phillips Cut Glass Company, Montreal, who invited the members to meet in his city, he was unanimously assigned this number and the labels left with him.

Within a month all members having signed the agreement will be supplied with their labels and rubber stamps with acid solution, so that one can confidently say that the fall business will show a tremendous quantity of cut crystal glass bearing a hall-mark guaranteeing its genuineness and quality.

This is the first time that a hall-mark not only guarantees the purity of the metal but also guarantees workmanship. The sterling mark and the karat mark only protect against inferior metal and have no relation to workmanship. Hence the cut crystal glassware label sets a new standard.

Barrel charges were taken up at the convention and it was decided to follow the practice in vogue, which is to charge to customers the same amount charged by the blank manufacturers, so that while they are being charged a dollar now, they charge the same until a change is made.

The next meeting of the Association will be held in Philadelphia, Pa., some time in December and in the meantime there will be many things done which will be reported at that convention. For instance, several committees are being appointed by G. William Sell, the president, to approach those cut glass manufacturers who are not showing active interest in the organization and ask them to put their shoulders to the wheel, and to invite other firms who are not members to join.

It was decided to organize a branch of light cutters, who would be admitted as associate members, and Ernest H. Bennett was requested to compile a list of such firms and request their membership. L. E. Schneider of the Acorn Advertising Agency was instructed to print labels and circulars for distribution among members.

The National Lead & Paint Company, who have been advertising cut glass in their national compaign were made honorary members of the Association as were Ernest H. Bennett of the *Jewelers' Circular;* Marcus I. Lester, of the *Pottery, Glass, Housefurnishing and Toys;* Calvin Demarest, of the *Crockery and Glass Journal;* L. E. Schneider, of the Acorn Advertising Agency; Howard R. Handy, of the *Pottery, Glass and Brass Salesman;* and G. W. Cooper, of the GLASS INDUSTRY. Several of these men have given a great deal of thought and assistance to the Association which in this way shows the appreciation by its members of the help given.

Heat Balance for a 25-Ton Glass Tank

By F. J. DENK

(Concluded from the July Issue)

(G) HEAT LOST THROUGH REGENERATORS

The waste gases enter the chambers with a temperature of 2,200° F. They now consist of the products of combustion and of the dissociation gases from the batch. The quantity generated in 24 hours amounts to

Carbon dioxide (CO_2) from combustion	679,829 cu. ft.	
Carbon dioxide (CO_2) from the batch	64,111 cu. ft.	= 743,940 cu. ft.
Nitrogen and oxygen (N_2) and (O_2)		4,172,056 cu. ft.
Water (H_2O) from combustion	360,602 cu. ft.	
Water (H_2O) from gas and air	261,580 cu. ft.	= 662,751 cu. ft.
Water (H_2O) from the batch	40,569 cu. ft.	
Sulphur dioxide (SO_2) from the batch		17,234 cu. ft.
Total		5,595,981 cu. ft.

Thermal capacity of gases at 2,200° F. (see table No. 2)[1]

Carbon dioxide (CO_2)	87.38 B.t.u. per. cu. ft.
Water (H_2O)	71.37 B.t.u. per cu. ft.
Nitrogen, Oxygen, Sulphur dioxide (N_2), (O_2), (SO_2)	46.08 B.t.u. per cu. ft.

Total heat in waste gases

Carbon dioxide (CO_2)	743,940 x 87.38 =	65,005,477 B.t.u.
Water (H_2O)	662,751 x 71.37 =	47,300,467 B.t.u.
Nitrogen, Oxygen, Sulphur dioxide (N_2), (O_2), (SO_2)	4,189,290 x 46.08 =	193,042,483 B.t.u.
Total		305,348,427 B.t.u.

The waste gases leave the valves at 700° F. Their thermal capacities at that temperature are (see under F and E-5)

81,449,512 + 2,213,740 = 83,663,252 B.t.u. per 24 hrs.

The regenerators, therefore, absorb within 24 hours

305,348,427 — 83,663,252 = 221,685,175 B.t.u.

This heat is used for

1) preheating the producer gas, and for
2) preheating the air required for combustion.

ad 1. *Heat required for preheating the Producer Gas.*

The temperature of the gas entering the valve is 725° F.; when leaving the chamber it is 1,500° F. The sensible heat in the gas and moisture (see under B) is 33,675,824 B.t.u.

At 1500° the gas has

(.0192 x 1500 + .00000149 x 1500²) x 2,077.200 =
2,077,200 x 32.17 = 66,823,524 B.t.u. per 24 hrs.

[1]Page 135, July, 1922, issue.

Heat in the moisture at 1,500° F.

(.021 x 1500 + .0000052 x 1500²) x 187,610 =
187,610 x 43.2 = 8,104,752 B.t.u. per 24 hrs.

or a total of

66,823,524 + 8,104,752 = 74,928,276 B.t.u. per 24 hrs.

The difference between the heat in the gas at 1500° and that at 725° is given up to the gas in the regenerator, viz.:

74,928,276 — 33,675,842 = 41,252,452 B.t.u. per 24 hrs.

ad 2. *Heat required for preheating the Air.*

The amount of air required for combustion is (see under F)

3,510,468 cu. ft. per 24 hrs.

containing 73,970 cu. ft. of water vapor. The air enters with a temperature of 100° F. and leaves with 1500° F. From table No. 2 we have

Thermal capacity of air at 1500° F	30.45 B.t.u.
Thermal capacity of air at 100° F.	1.91 B.t.u.
Difference	28.54 B.t.u.

This gives a total heat in the air of

3,510,468 x 28.54 = 100,188,757 B.t.u. per 24 hrs.

Similarly, the heat in the water vapor is

at 1500° F.	43.24 B.t.u.
at 100° F.	2.20 B.t.u.
Difference	41.04 B.t.u.

which gives

73,970 x 41.04 = 3,035,729 B.t.u. per 24 hrs.

Total heat given up by the regenerators to the air and the moisture

100,188,757 + 3,035,729 = 103,224,486 B.t.u. per 24 hrs.

Heat balance of the regenerators:

Sensible heat in the waste gases	221,685,173 B.t.u.
For heating the gas are used 41,252,452 B.t.u.	
For heating the air are used 103,224,486 B.t.u.	
Total	144,476,938 B.t.u.
Difference or lost	77,208,235 B.t.u.

The efficiency of the regenerators proper is, therefore,

$$100 - \frac{77{,}208{,}235 \times 100}{221{,}685{,}173} = 65.17 \text{ per cent}$$

and the heat loss through the regenerators is

$$\frac{77{,}208{,}235 \times 100}{425{,}214{,}518} = 18.16 \text{ per cent}$$

From the data obtained by the preceding calculations, we can derive the following

HEAT BALANCE FOR 24 HOURS

A. Heat Input		
1) Heat of combustion of coal	413,370,000 B.t.u.	97.21 per cent
2) Heat in the steam	11,844,518 B.t.u.	2.79 per cent
Total	425,214,518 B.t.u.	100.00 per cent
B. Heat Used		
1) Producer losses	73,184,312 B.t.u.	17.22 per cent.
2) Line losses	32,843,242 B.t.u.	7.72 per cent.
3) Heat used for glass making	45,962,373 B.t.u.	10.81 per cent
4) Heat carried away by the waste gases	81,449,514 B.t.u.	19.16 per cent
5) Regenerator losses	77,208,235 B.t.u.	18.16 per cent
6) Radiation losses and unaccounted for	114,566,842 B.t.u.	26.93 per cent
Total	425,214,518 B.t.u.	100.00 per cent

The distribution of the heat and of the heat losses to the different items is illustrated in Fig. 1, which also shows at a glance how small the amount of heat is, which is usefully applied, compared with all the losses occurring between the producer on

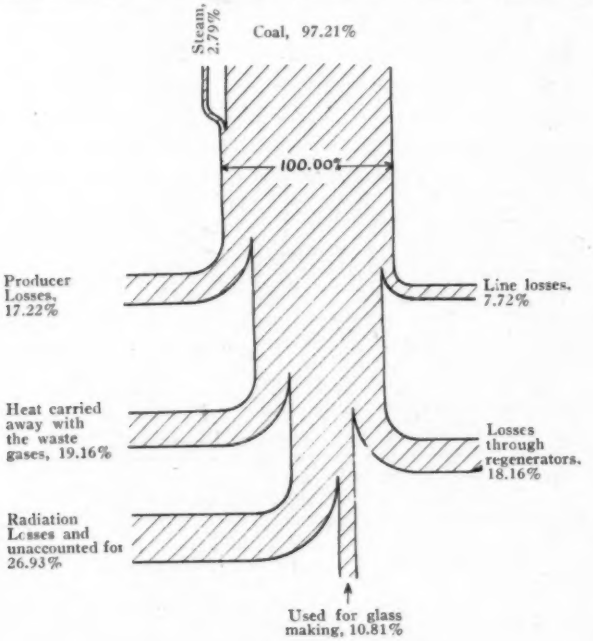


FIG. 1
DISTRIBUTION OF HEAT AND HEAT LOSSES

the one end and the stack on the other. In what way some of these losses may be avoided will be explained in the next paragraphs.

(H) CONCLUSIONS

1) *Producer Losses*

Starting with the items as they are enumerated in the final heat balance, it will be noticed that the producer losses can not be materially reduced as long as raw producer gas is used. The efficiency of an ordinary gas producer is always around 80%, sometimes a little more, sometimes a little less, but there are not very many chances to improve operation.

2) *Line Losses.*

The line losses are very high in the present case. The reason for this was due to local conditions, which, however, show plainly the influence of a correct layout of a plant. The gas outlet of the producer was higher than the ports of the tank, thus obstructing the natural flow of the gases. This accounts to a large extent for the high temperature drop in the line, which, besides, was not protected against radiation. At a later addition to the plant the disadvantage was avoided by conveying the gases in an underground flue, which gave much better results. A comparison of the two installations will show the advantage of the latter over the former.

The temperature drop in an underground flue has been found by tests to be .8° F. per running foot. This gives, for a length of 250 feet, a drop of 250 x .8 = 200° F., so that the gas reaches the tank at 1350 — 200 or 1150° F. The sensible heat in the gas for the temperature difference is (see derivation of formula under A-d)

$[.0192 \times (1350 - 1150) + .00000149 \times (1350^2 - 1150^2)] =$ 4.59 B.t.u.

Total sensible heat in gas

2,077,200 x 4.59 = 9,534,348 B.t.u. per 24 hrs.

For the moisture we have similarly

187,610 x 6.8 = 1,275,748 B.t.u. per 24 hrs.

The total loss in this case is 10,810,096 B.t.u. per 24 hrs.

This amounts to only

$$\frac{10{,}810{,}096 \times 100}{425{,}214{,}518} = 2.55 \text{ per cent}$$

which means a saving of 7.72 — 2.55 or 5.17 per cent.

3) *Heat used for Glass Making.*

The use of burnt lime and soda ash instead of limestone and soda will reduce the fuel consumption to a certain extent. The amount of heat required for the dissociation of the carbonates (see E-2) would become eliminated and only the heat for the dissociation of the salt cake, viz.: 8,583,575 B.t.u., would be required, instead of the 20,668,510 B.t.u., as shown. On the other hand, a certain quantity of heat is lost on account of the soda ash and the lime being the only parts of the batch which give up their heat of formation when forming silicates. This heat amounts to 6,175,092 B.t.u. per 24 hrs., instead of the former 9,040,987 B.t.u. per 24 hrs., or a difference of 2,865,895 B.t.u. per 24 hrs (see E-6). The total heat required for glass making would be 36,843,333 B.t.u. per 24 hrs., instead of 45,962,373 B.t.u. per 24 hrs., reducing the B.t.u. consumption from 1219 B.t.u. per lb. glass to 977 B.t.u. per lb. glass (see E-8 at the end). Keeping the same ratio as before, which was—Heat in coal used actually for glass making: Heat in coal used = 1 : 9, this would reduce the quantity of coal consumed per pound of glass from .8 to .64 lbs., which would mean a saving in coal of 4,800 lbs. of coal in 24 hrs.

Larger savings, however, can be made when the tanks or furnaces are built in such a way that the heat brought in will be utilized in the best possible and most efficient manner; and there is only one way in which to do that, i.e., to base the design on a calculation and not on guesswork. If this method is followed, there will be a possibility of reducing the coal consumption considerably. The writer knows that in one plant this fuel consumption was, by following the suggestions, reduced to one-third of a pound of coal per pound of glass. Using the same heat value as above this would mean 4,593 B.t.u. per lb. glass, instead of the original 11,023 B.t.u., which is only 3.75 times as much as is actually used for glass making.

The ways and means to be applied to this effect, however, cannot be shown here, as they have nothing directly to do with the subject of the present paper. If there is any possibility, the writer may, in a later article,[1] show how and where improvements in tanks can be made to give better results than are obtained with many of the present installations.

4) *Heat carried away with the Waste Gases.*

A small reduction of this loss will be effected by using burnt lime and soda ash, but the biggest savings can be made when the waste gases are used under waste heat boilers, which will supply steam to the producers or for other purposes. A large amount of heat otherwise going up the stack can be reclaimed in this way, but, since the subject of the application of waste heat in glass houses is also outside of the scope of this paper, it will not be further dealt with here. Suffice it to say, that between 7 and 10 per cent of the heat lost can be reclaimed, thus reducing the

[1]Unfortunately, the author's untimely death on May 18, 1922, shortly after completing this article, put an end to the plan for giving to the industry, through a series of articles, the benefit of his long experience in, and deep knowledge of fuel and furnace problems.

losses due to the waste gases from about 19 per cent to around 10 or 12 per cent.

5) *Regenerator Losses.*

The losses through the regenerators are far too high. They should not be more than about 4 or 6 per cent, instead of the 18.16 per cent as in the present case. The large percentage shows that the chambers were not working right. The preheating of the gas and the air was inadequate, which proves that the chambers were too large for the work they were called to do. Dead pockets were formed in the chambers, causing the heat losses. There can be no doubt that a better working of the regenerators would be of general benefit to the operation of the tank and for this reason utmost care should be taken when determining the size of the chambers. Too much or not enough, both conditions are detrimental to an efficient working of the furnace.

The possible savings, so far enumerated, amount to
Approximately 5 per cent from the line losses,
Approximately 7 per cent from the losses due to the waste gases,
Approximately 12 per cent from the regenerators.

This is a total of 24 per cent, corresponding to

$$\frac{413{,}370{,}000 \times .24}{13{,}779} = 7{,}200 \text{ lbs. of coal per 24 hrs.}$$

Adding to this amount the saving from the use of burnt lime and soda ash of about 4,000 lbs. per 24 hrs., makes a total of 11,200 lbs., or 5.6 tons per day. (4,000 lbs. was used here, because the 4,800 lbs. calculated before cannot all be considered as pure saving.) With, say, 330 working days and a cost of $2.50 per ton of coal, this amounts to the nice little sum of $4,620.00.

6) *Radiation Losses and Unaccounted For.*

A large amount of energy is going to waste through the walls and the crowns of the furnaces. This loss can be partly prevented by an increase in the thickness or by a cover of a suitable insulating material of the furnace parts involved. Special attention, however, must be given to those parts of the walls which are below the metal line, because insulating them would cause their being eaten away by the molten glass. These walls should be just thick enough to permit enough heat to be radiated to the outside to counteract the dissolving action of the molten glass on the inside. If they are made thicker, they will be destroyed until the required thickness is reached.

Insulating the walls is a good means to prevent heat losses, but it should be considered from case to case, whether or not the increased cost of the wall would warrant the installation. On the other hand, the cost for the insulation is to be paid only once in a long while, whereas the cost for the fuel losses is going on continuously. To show from one example how large the saving in heat would be, let us consider first the heat losses through a wall built of 18 in. silica brick and then through one made of 9 in. fire brick, 4½ in. Sil-O-Cel insulating brick and 4 in. red brick. (The data are taken from curve sheets issued by the Celite Products Co.) The heat lost through an 18 in. wall amounts to 1,200 B.t.u. per sq. ft. per hr.,for an inside temperature of 2,600 deg. F., while the corresponding loss through the insulated wall is only 300 B.t.u. per sq. ft. per hr. This means a saving of 900 B.t.u. per square foot of surface per hour. Assuming a horizontal wall area of 300 sq. ft. to be protected, this would equal a saving of

$$\frac{900 \times 300 \times 24}{13{,}779} = \text{about 500 lbs. of coal per day.}$$

How much saving could be made finally, by increasing the thickness of the wall or crown from 12 in. to, say, 18 in.? A calculation to this effect has been given by Dr. M. W. Travers, F.R.S., in his presidential address, delivered at the Annual General meeting of the Society of Glass Technology on April 20th, 1921, and published in the August, 1921, issue of the *Journal* of this Society. The calculation has been transposed by the writer into English units and shows (see Fig. 2) that a saving of 720 B.t.u. per sq. ft. per hr. can be effected by increasing the thickness of the crown from 12 in. to 18 in. The two straight lines in Fig. 2 show the heat losses for the two thicknesses and for different temperatures, the curve gives the losses due to radiation and conduction from the outside of the crown. The intersection of the curve and the straight lines indicates the losses due to the wall thicknesses, which show a difference of 720 B.t.u. Assuming a crown area of 650 sq. ft., the loss expressed in coal will be

$$\frac{720 \times 650 \times 24}{13{,}779} = 815 \text{ pounds per 24 hours.}$$

Here, too, the extra cost for the additional silica brick, or whatever material would be used to increase the thickness of the crown, the extra steel work eventually required and the extra labor must be taken into account. But the same holds good in regard to the crown that was said in regard to the wall: it does not have to be rebuilt very frequently.

The calculations and data just given prove clearly that it would be worth while to make investigations into the advisability of saving some of the furnace and other losses. Neither the glass tank nor the pot furnace, as a rule, are working with their best possible efficiency, and there is no doubt that improvements can be made which will give better and more satisfactory results to the benefit of all concerned.

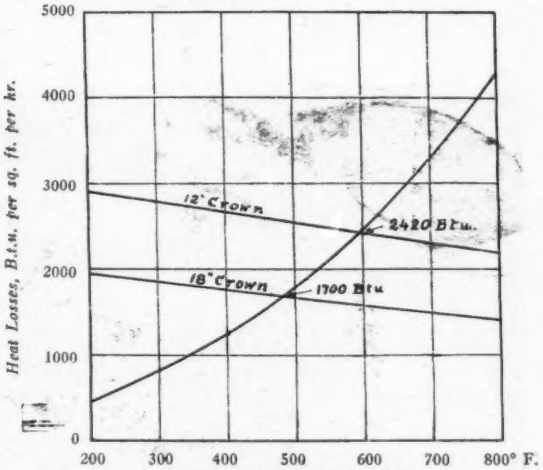


FIG. 2

CURVES SHOWING HEAT LOSSES THROUGH CROWNS OF VARYING THICKNESSES. INSIDE TEMPERATURE OF CROWN 2550° F.

(I) RECOMMENDATIONS

In closing, a few recommendations will be made which, when followed out, will give satisfaction. They are only a few, but they comprise those which are mostly sinned against.

(1) Bring the producer as close to the furnace as possible;

(2) Lay the gas flue between producer and tank or furnace underground wherever it can be done, or cover the overhead flue with insulating material;

(3) Build the regenerating chambers according to scientific principles and consider at the same time local conditions;

(4) Keep the same in mind in regard to ports and furnaces;

(5) Avoid any guesswork or rule of thumb methods when designing gas producer installations or furnaces.

Black Stain for Cutting Tables*

SOLUTION No. 1	SOLUTION No. 2
Copper Sulphate ....125 grams	Fresh Aniline Oil.. 150 grams
Potassium Chlorate..125 "	Concentrated Hydro-
Dissolve in water and dilute to	chloric Acid .....180 "
one liter.	Water .....1000 "

Apply two coats of Solution No. 1, boiling hot, with a paint brush. Allow the first coat to dry before the next one is applied. Keep the volume of the solution constant during the heating.

When the second coat is dry apply two coats of Solution No. 2, boiling hot. When the wood is completely dry wash off all excess chemicals with hot soap suds, until the color is a dark green. Finish with raw linseed oil. Rub down the oil with cloth or sponge until a jet black, polished surface is obtained. Whenever the table becomes dull, rub with linseed oil.

*Information supplied by Dr. C. W. Waggoner.

Lime for Glass Making*

By R. R. SHIVELY†

Glasses are fused mixtures of an acid, silica, rarely boric acid, and alkali, generally soda, and an alkaline earth, usually lime. The fused mixture of sand and soda is quite soluble, and we know it as water glass. The addition of lime decreases the solubility. A glass containing about 8 per cent of lime is very insoluble.

All three forms of lime are used in glass making and each has its supporters who believe that good glass cannot be made from any other form of lime. Certain manufacturers will not use a lime containing 3 per cent of magnesia, while others prefer a dolomitic lime with 35 per cent or 40 per cent magnesia present. In this short paper it would be impossible to thoroughly discuss all the various phases of the lime problem, but an attempt will be made to give specifications which have proven satisfactory in many instances, and some of the reasons for these requirements.

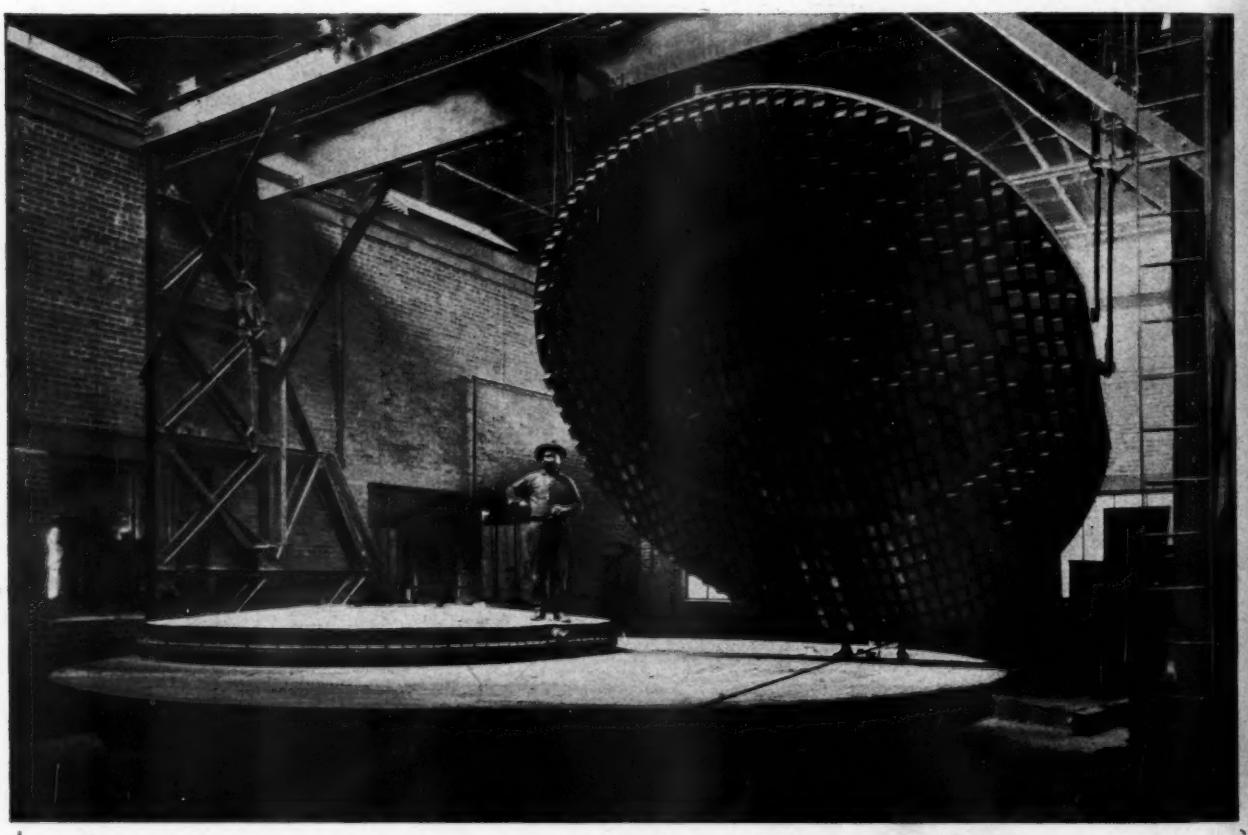
Before entering into this discussion, it seems necessary to cite a few recent developments in the glass industry which have greatly influenced glass making and have been responsible for much more care being taken in the selection and control of glass making materials. In recent years a great stride has been made in glass forming machines, and these machines require glass of constant physical properties. The hand operator can make his manipulation suit the glass, but the glass must be made to suit the machines. These machines have been responsible for increased production, and materials must be selected with this point in view. Another thing which has been responsible for more careful specifications on glass making material is the passing of natural gas. The producer gas is less constant in composition and there is more or less heat variation which tends to retard the planing off of the glass. In recent years selenium has come into general use in certain kinds of glass as a decolorizing agent. This

*Presented at the meeting of the National Lime Association, Cleveland, O.
†Chemical Engineer, Monongah Glass Co.

Modern Methods of Making Pla

A Series of Interior Views of a

By Courtesy of Allegheny Plate Glass Compan



9. Glass Grinding Runners. Here is shown the under surface of one of the glass grinding runners, which work in pairs on revolving decks. The small blocks are the iron shoes, between which the abrasive runs. Each of these runners weighs 8,000 pounds, making a total of 16,000 pounds grinding pressure on one deck of glass. The illustration shown above is not a grinding machine, of course, but merely the runners on their way to installation. In the foreground is one of the circular grinding decks or tables on which the rough plate passes through the surfacing operation.

has supplanted manganese and nitre. Without nitre present to oxidize the organic matter in limestone an objectionable color is produced. This has caused some manufacturers to revert to the use of quicklime.

Limestone has many advantages over other forms of lime; the most important ones are low cost, constant composition, and it is less objectionable to handle. The chief objection to limestone is that it requires more heat to melt a limestone batch than batches of quicklime or hydrated lime. From a thermo-chemical standpoint this is true, and practical experience has verified the thermo-chemical data beyond question.

Quicklime is preferred by many because of its being less difficult to melt and practically free from organic matter. It is objected to because of its being unstable, unpleasant to handle and expensive.

Hydrated lime is used but little, but is recommended by some because of the benefit said to be derived from the expulsion of water in the melting process. However, it is unstable, expensive, and harder to melt than quicklime.

In giving specifications for lime products for glass making it must first be mentioned that there is a wide variation in the requirements of different factories. This is caused by the size of the tank furnace, by the quality of glass being made, and by the kind of glass being made. Where window glass is made, coarse limestone is usually preferred and the iron content may be as high as .8 per cent, while with tableware a finely ground product is preferred with not more than .2 per cent of iron. Accordingly, it is the idea of the writer that each factory should find its requirements, and that these should be adhered to as closely as circumstances permit.

All requirements of the different factories could come under the following specifications:

The alkaline earth content should be not less than 90 per cent and should not vary more than 2 per cent from the established specifications.

The iron content should be as low as possible and the general range is from .1 per cent to .8 per cent. This should not vary more than .1 per cent in various shipments.

The alumina and silica content is not objectionable, but, when once established, the alumina should not vary more

Plate Glass Illustrated

of a Successful Factory

Company, Glassmere, Pennsylvania

10. The Grinding Operation. The deck has been rolled underneath the grinders, the tracks are lowered, and the table rests on a "spider" at the top of a vertical power shaft. The "spider" and shaft whirl the deck at a speed of 22 r. p. m. and each grinder has its individual motor, developing 400 h. p. The grinding runners rest entirely on the deck, and receive their motion from the friction of the latter's revolution. This operation takes about one hour to complete. Seven distinct grades of abrasive are used, from coarse to fine emery, drawn by the operator from overhead containers.

than .5 per cent and the silica not more than 1 per cent from the established composition.

Sulphates are objected to by some, though really the writer does not feel this to be entirely justified. However, we have established the specifications of 1 per cent sulphates in limestone and not more than 1 per cent sulphur as sulphates in quicklime.

In quicklime the loss on ignition should not be over 3 per cent as shipped.

Fineness is an important factor, and is governed entirely by the requirements of different factories. In large tanks, coarse stone is better than fine stone. If the tank is being pulled up to capacity some believe that fine stone will increase the production. However, unless otherwise specified, all limestone and quicklime should pass a 20-mesh sieve.

The specifications given vary but little from those recently published in Bureau of Standards Bulletin No. 118. The adoption of these specifications will go a long way toward helping the glass manufacturer, and will also help the lime manufacturer in knowing what is expected of him.

The Laboratory

By J. B. KRAK

The Valuation of Coal. II.

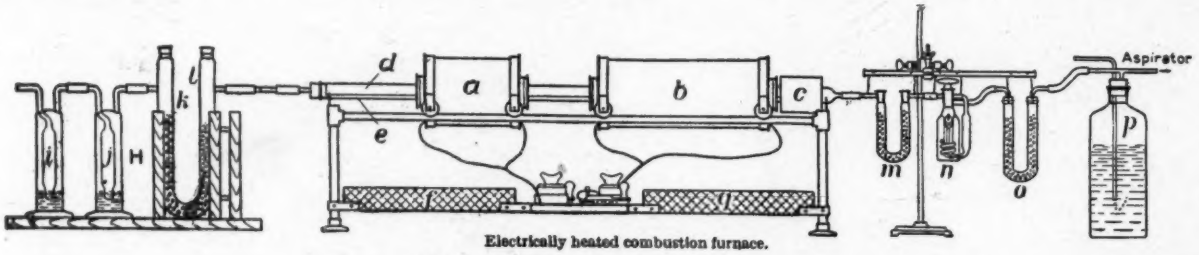
The ultimate analysis of coal furnishes more definite information regarding its quality than the proximate analysis. However, more apparatus and considerably more skill on the part of the analyst are required to obtain accurate results. For these reasons it is not used as much as is desirable. While the proximate analysis gives a fair indication as to the quality of the coal, it is impossible to judge a sample definitely without the results of an ultimate analysis.

In the ultimate analysis the composition of coal is expressed in percentage of carbon, hydrogen, oxygen, nitrogen, sulphur and ash. The estimation of carbon and hydrogen is effected by what is known as the combustion process. A known quantity of coal is completely oxidized, the carbon being thus converted into carbon dioxide and the hydrogen into water. These two products are collected, the water in calcium chloride, the carbon dioxide in a solution of potassium hydroxide, and weighed. From the weights of the products, the weights of carbon and hydrogen are calculated. Nitrogen is determined by the Kjeldahl method; sulphur and ash are estimated as described in the proximate analysis. No reliable method is known for the direct estimation of oxygen in coal and it is therefore determined by subtracting the sum of the other five constituents from 100. The result is always inaccurate as this method throws the summation of all errors incurred in the other determinations upon the oxygen.

The ultimate analysis does not distinguish between the carbon and hydrogen derived from organic matter and the small proportion of these elements that may be present in the mineral impurities in incombustible form. These errors, however, are of little importance in technical analyses.

It should be kept in mind that the hydrogen and oxygen of the moisture in the sample are included with the hydrogen and oxygen of the dry-coal substance. Therefore, in order to compare ultimate analysis of coals, they should be computed on a dry basis.

The best results are obtained with an electrically heated combustion furnace, consisting of three independent heaters, two of which (a and b) are provided with wheels and are mounted on a track so that they are movable along the combustion tube. The third heater (c) is stationary. The apparatus consists of a purifying train, in duplicate, a combustion tube of fused silica or pyrex glass, drawn out on one end, and an absorption train. The oxygen or air entering the combustion tube is purified by passing through the purifying train which contains sulphuric acid, (i) for removing possible traces of ammonia and organic matter, 30 per cent potassium hydroxide solution, (j) granular soda-lime, (k) and granular calcium chloride (l). One side of the train is connected with an oxygen tank provided with a reducing valve for regulating pressure. The other side is used to purify the air supply. The combustion tube is about 90 c.m. long. The first 30 c.m. of the tube is empty; following the empty space is an asbestos plug; the next 40 c.m. is filled loosely with granular copper oxide. A second asbestos plug separates the copper oxide from 15 c.m. of fused lead chromate which is held in place by another asbestos plug. The drawn out end is connected with the absorption train by means of a piece of rubber tubing.



Electrically heated combustion furnace.

The absorption train consists of a U-tube (m) filled with granular calcium chloride to absorb the water formed. Before using, the calcium chloride should be saturated with carbon dioxide to avoid possible absorption of carbon dioxide during a determination by any traces of calcium oxide that may be present. The tube is connected to a Vanier potash bulb (n) containing a 30 per cent potassium hydroxide solution and granular calcium chloride. Six to eight determina-

tions can be made without recharging this bulb. The potash bulb is connected to an aspirator through a guard tube (o) containing calcium chloride and soda-lime and a Mariotte flask (p), which keeps the pressure constant. The flask is connected to an aspirator which draws air, oxygen and the products of combustion through the train.

Before starting a determination a blank is run by aspirating about one liter of air through the train, which is heated in the same manner as if a determination on coal were being made. If the potash bulb and the tube containing calcium chloride show a change in weight of less than 0.5 m.g. each, the apparatus is in proper condition for use.

A sample weighing from 0.2 to 0.25 gram is weighed into a platinum or porcelain boat, which is transferred to the combustion tube. The first 30 c.m. of the tube should be cool. The copper oxide should be red hot (about 600° C.) and the lead chromate at a dull red heat. As soon as the boat is in place the stopper connecting with the purifying train is inserted and the aspiration started with oxygen gas at the rate of three bubbles per second. The current is then turned on heater (a) until the coal ignites. The heater is pushed back during the ignition of the coal to avoid a too rapid combustion, and is then pushed forward again. The heating is continued until all black particles in the boat have disappeared. After combustion is complete the current is turned off the heater (a) and this heater moved back to allow the tube to cool for the next determination, and about 1,200 cc. of air is aspirated. The absorption bulbs are then disconnected and weighed. The ash in the boat is weighed and carefully inspected for any unburned carbon which would destroy the value of the determination.

Calculations:

$$\frac{\text{Weight of } H_2O \times .1119 \times 100}{\text{Weight of Sample}} = \%\ \text{Hydrogen}$$

$$\frac{\text{Weight of } CO_2 \times .2727 \times 100}{\text{Weight of Sample}} = \%\ \text{Carbon}$$

ESTIMATION OF NITROGEN

The method used for the determination of nitrogen in coal is that devised by Kjeldahl. It consists in heating the coal with concentrated sulphuric acid and a drop of mercury. By this means the nitrogen contained in the coal is converted into ammonia, which, of course, unites with the sulphuric acid. The ammonia is set free by the addition of sodium hydroxide, and is estimated by absorption in a measured amount of standard sulphuric acid.

Transfer a one gram sample to a 500 cc. Kjeldahl flask, add 30 cc. of concentrated sulphuric acid and about 0.6 grams of mercury. Heat until the solution is nearly colorless, and continue at least two hours after the solution has become straw-colored. A few crystals of potassium permanganate added after digesting one hour aid in reducing the time of boiling required for the oxidation of coke and anthracite. After cooling the solution is diluted to about 200 cc. with cold water. Add 25 cc. of potassium sulphide solution (40 grams per liter) to precipitate the mercury. Add enough saturated sodium hydroxide to make the solution distinctly alkaline and connect at once with the condenser. Distill the ammonia into 10 cc. of standard sulphuric acid solution until about 200 cc. of distillate has passed over. Titrate back with standard ammonia solution using cochineal indicator.

A Study of Brown Glass Milk Bottles*

By DR A. W. BITTING†

Brown, or amber glass, as it is more generally known to the glass industry, is used to some extent in bottles for the marketing of buttermilk. The primary object is to enable drivers of milk wagons and waiters in eating places to promptly identify it and thus avoid confusion with whole milk in delivering and serving. Another object is to render less prominent any separation of whey when that mishap occurs. The use of the amber bottle in this way prompted some workers at the Iowa Agricultural College to study the use of the bronze bottle in comparison with the clear in the delivery of ordinary milk.

A summary of the results obtained by them follows:

The amber color is objectionable because it makes it difficult or impossible to determine the cream line which is an important point with the consumer. The cream line is his best index of quality. The amber color conceals sediment or dirt in the milk and this is regarded as highly important on account of its bearing upon the inspection as to the sanitary quality of the milk. A third obvious objection and of importance to the dairyman is that the color interferes with inspection for cleanliness after the bottles are washed.

The effect upon the quality of the milk was determined by filling clear and amber bottles with milk and allowing them to be exposed to similar conditions to those occurring in delivery. It was found that when bottles of both kinds were exposed to the sun that the milk in the brown bottles acquired a temperature of from three to five degrees higher than that in the clear glass. The bacterial contents and acidity was increased so that it ceased to be sweet milk much sooner than in the clear glass. The bacterial increase and change in composition seemed to be more marked than could be accounted for on the difference due to temperature alone. The clear glass evidently permits the strong light to exercise some inhibiting effect on the organisms, while the brown has a less restraining influence. As milk is delivered on porches, door steps and any other convenient place in cities and often exposed for rather long periods, it becomes evident that the amber bottle is not as well adapted to the purpose as clear glass.

There are two other factors in the delivery of good milk, one the retention of the best possible flavor and the retention of the color. It is well known that milk when exposed to a strong light may acquire a tallowy taste, and sometimes a rich looking milk will take on a dead or chalky appearance. On these two points the amber bottle showed an advantage over the clear glass.

We are not aware of similar work having been done on beverages, fruit juices, etc., in clear and amber glass, but it is suggestive as having some practical applications.

*The Glass Container, July, 1922.
†Director of Research, Glass Container Association.

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NEW YORK, AUGUST, 1922

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Machinery and Research

The most striking feature in the development of the glass industry during the past twenty years is the substitution of hand labor by machinery and the resultant quantity production of glassware. In no other field has American genius for mechanical invention had a greater opportunity to manifest itself and the achievements in glass making have not been surpassed in any other industry. A consideration of all features involved cannot fail to reveal, however, that, for the present at least, the mechanical development has far outgrown the advance of knowledge of the physical and chemical phases of the problem. Seemingly the fact has been lost sight of, that what is desired is not the building of a marvelous piece of machinery but the production of glass of a high quality. Progress has been due almost entirely to the labors of the mechanical engineer, whereas the physicist and the chemist have contributed but little. Yet without the proper teamwork of this technical triumvirate, mechanical glass production will never be a complete success.

The hand operator has always plenty of fault to find with defects which occur in glass, yet it is part of his skill to make the manipulation suit the properties of the metal. Machines cannot adjust themselves to varying conditions. Mechanical glass making requires definite and unchanging physical properties to produce the best results and these can only be brought about by application of the knowledge of factors which hitherto have been considered of secondary importance. With the introduction of the machine it becomes necessary to exercise careful control of temperatures and to maintain a uniform chemical composition of the finished product. The latter in turn depends on knowledge of the composition of the raw materials and the ability to calculate adjustments of the batch to obtain the required uniformity.

Every production manager knows that greatly increased profits will accrue to the organization which can permanently eliminate the majority of defects, commonly occurring in glass. He also realizes that no amount of mechanical perfection will prevent devitrification, scum, blisters, stones, lines, excessive breakage and kindred troubles. The causes of these difficulties lie deeper. Some of them are known; some of them are vaguely understood, some of them are as yet incomprehensible. After having obtained all that can be desired in a mechanical way the problem to be solved remains the elimination of defects due to the nature of glass. To accomplish this end a great deal of money will have to be spent and a far greater amount of the most painstaking labor will be needed. The powerful organizations which have been formed in recent years have the necessary funds to establish research departments in keeping with the magnitude of their enterprises. It is another matter to find men with the necessary knowledge of glass manufacturing combined with an understanding of what the glass industry needs to know at the present stage of development, and who have had the training to get results.

It is only recently that the more progressive firms have established laboratories for control and research in connection with their plants. While this is a step in the right direction,

in many instances the management has been unwilling to go far enough Glass making is a branch of the chemical industry and unless the chemical engineer, the physicist and the mechanical engineer meet on equal footing the necessary co-operation will be lacking. In too many instances the chemical laboratory is put in some obscure corner of the plant. It is poorly equipped to carry on the important work which it is called upon to do. Its personnel is underpaid and does not receive the encouragement to which it is entitled. Many a firm which would not hesitate to spend $50,000 for a piece of machinery, would consider the expenditure of one fifth of this amount for laboratory equipment an extravagance.

The question before the manager of an industrial organization finally resolves itself to the query: will it pay? Will the results justify the expense? In reply it may be profitable to point to a few organizations whose names stand for success: The General Electric Company, the Eastman Kodak Company, Corning Glass Works, who maintain research organizations. The men leading the affairs of these enterprises know that research not only increases present day profits, they realize that it lays the foundation for far greater development in the future.

Technical Consultation Service

THE GLASS INDUSTRY invites its readers to refer to this department any problems with which they may be confronted pertaining to raw materials, glass technology, laboratory and factory practice. While making no pretensions to the possession of unbounded knowledge or infallibility THE GLASS INDUSTRY is ready to assist its readers to the best of its ability in solving their problems. Readers who can offer better suggestions are invited to submit them.

Questions should be submitted in writing and will be answered by mail as promptly as possible. The sources of all inquiries will be held in strict confidence.

Question 32—Crust Deposit on Flattening Stones.—I am foreman of a large flattening department where producer gas is being used and am having considerable trouble with the flattening. I find the producer gas causes a crust to form on the flattening stones, which makes indentations in the surface of the glass. I am also troubled with a fine hot burn which the flatteners, so far, have been unable to eliminate.

What would you suggest to rub the flattening stones with and how often should they be rubbed?

The producer gas we are using runs from 900° to 1200° F. in the tunnel at the ovens and shows the following analysis:

CO_2	— 3.8
Ill	— .9
O_2	— .4
H_2	— 11.4
CO	— 25.9
CH_4	— 2.5
N_2	— 55.2
B. T. U.	—157.3
% Com.	— 41.0

To get a smoky fire, must run all air closed at the ovens. Do you think producer gas with above qualities suitable for the flattening of window glass?

Answer.—I can only make a guess as to the cause of the trouble and am inclined to think that is about all any one can do who has not seen the "crust" on the flattening stones. My guess is that the coal is high in sulphur and that the crust is due to the action of sulphurous acid on the stone.—J. B. K.

An experienced glass man thinks that the trouble may be aggravated by the use of coal of inferior quality. He suggests that you rub the flattening stones once or twice a day with soapstone or chalk, using compressed air to clean off the stones. He believes the fire burn is caused by hot stones and states that this trouble has been cured by using perforated iron plates under the stones, in preference to solid plates.

Letters to the Editor

Many Glass Factories Improving Their Methods

Interesting data indicating the extent to which glass manufacturers are making use of the services of technically trained advisors in their efforts to advance their manufacturing practices over prevailing methods is found in the letter printed below, from Irving E. Adams.

To the Editor of THE GLASS INDUSTRY:

It has been some time since I have written you and I am still just as far from having a paper prepared as at my last writing, but I have been reading your publication from cover to cover each month and you at all times have my best wishes for success. I have just been summing up my activities since entering the general consulting field about a year ago, and find that I have served to date twenty-three glass companies, over a total of 192 working days. Some of the firms that I have visited recently are the Mound City Glass Company, Lumberport, W. Va.; Flaccus Glass Company, Tarentum, Pa.; Phoenix Glass Company, Monaca, Pa.; Standard Plate Glass Company, Butler, Pa.; Berney-Bond Glass Company, Clarion, Pa.; Turner Bros. Company, Terre Haute, Ind.; Glenshaw Glass Company, Glenshaw, Pa.; Diamond Bottle Company, Royersford, Pa.; and the Spring City Bottle Company, Spring City, Pa.

The J. E. Marsden Glass Works has finally been located at Ambler, Pa., and construction work is now in progress. I have concluded a year's contract on a part time basis with this new concern and will give them a minimum of six days per month during the coming year.

Outside of the Marsden plant I am giving the Hygeia Glass Corporation, Lancaster, N. Y., one day each month; the Pierce Glass Company, Port Alleghany, Pa., one to three days each month; the Standard Plate Glass Company, Butler, Pa. and the Berney-Bond Glass Company, Clarion, Pa., two to three days each month each. I am going to the Glenshaw Glass Company semi-monthly.

I noticed a statement in a recent issue as to the work at the Mound City Glass Company. I may say that I expect to heat up that equipment for the Simplex Engineering Company.

The first time that I have a little leisure I am going to try to write something of interest for your publication.

IRVING E. ADAMS,

639 North Spring Garden St.,
Ambler, Pa., July 20, 1922.

Progress of Fourcault Installations

To the Editor of THE GLASS INDUSTRY:

Answering your letter of the 18th regarding European conditions and as to the latest news concerning the introduction of the Fourcault process, I wish to state that the three component parts of the American Fourcault Machine Company, namely the Jeanette Window Glass Company, the Quertinmont Glass Company and ourselves are actively engaged in or about to start on our installation. The Quertinmont Glass Company has its machines ordered and paid for, delivery is to be made during August and the installation will proceed immediately in the Fairchance plant. The Jeanette Window Glass Company is completing its financial arrangements to go ahead with the contemplated installation and we are doing likewise except that while in Europe I ordered the machines for our plant and we will probably be ready a little ahead of the Jeanette Company. We found that the Fourcault machine is turning out a very fine grade of window glass in all its forms. We found also that the process has made its way in Germany, France, Italy and Greece, besides the former installation in Czecho Slovakia, Holland and England. It is also being installed in China besides another installation in Japan, in other words this process will soon be in vogue all over the world and there is no question in our minds but what it is as good and economical a process as has ever been devised, comparatively simple of operation, yet with potential possibilities as to quality.

THE BLACKFORD WINDOW GLASS COMPANY.
FRANK BASTIN, Sec'y and Gen. Mgr.

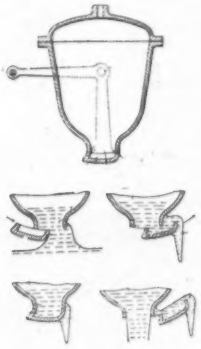
Vincennes, Ind., July 24, 1922.

Recent Patents

NEW INVENTIONS DESIGNED TO IMPROVE GLASS AND THE MEANS OF PRODUCING IT

Copies of the Patent Specifications mentioned below may be obtained from the Commissioner of Patents, Washington, D. C. Price 10c. each.

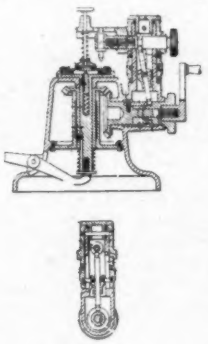
Apparatus for Gathering Glass from a Molten Mass. U. S. 1,417,684. May 30, 1922. Alfred Cecil Pilkington, of Rainhill, and Joseph Gaskell, of St. Helens, England, assignors to Pilkington Brothers, Limited, of St. Helens, Lancaster, England.



This invention relates to apparatus for gathering glass from a molten mass and delivering it at any desired point, and it has for its object an improved device for delivering the glass free of dirt and chilled glass and, in particular, for gathering and delivering the large quantities of glass required for casting discs for searchlight mirrors, in which homogeneity of the glass is of great importance.

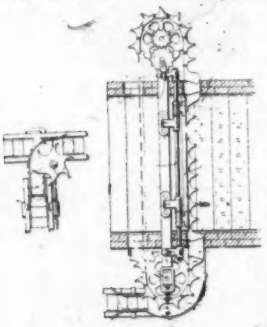
The device which forms the subject of this invention is of the pipette type, that is to say, of the type in which the glass is drawn into the gathering vessel either by immersing its mouth into the molten glass and exhausting the air from the upper part of the vessel or by immersing the vessel into the molten glass while the upper part of the vessel is open to the air, and then withdrawing it after closing the opening to the air.

Machine for Cutting Noncircular Glasses. U. S. 1,418,492. June 6, 1922. Adolf Steinle, of Jena, Germany, assignor to the firm of Carl Zeiss, of Jena, Germany.



The invention relates to machines for cutting non-circular glasses, especially spectacle glasses, and more particularly to such machines as have a rotatable table, on which the workpiece is fixed, and the cutting tool of which is moved, while cutting, approximately radially to the axis of the table. According to the invention the motion of the cutting tool is produced not directly by a template or similar means providing a guiding curve, but by interposing a two-armed lever having a displaceable center of rotation.

Bottle-Feeding Mechanism for Annealing Ovens. U. S. 1,419,324. June 13, 1922. William Stender, of Milwaukee, Wis.



Among other features the inventor claims the combination with an annealing oven, of means for conveying a row of bottles thereinto including an endless belt conveyor having a series of fingers for grasping the bottles successively and conveying them into and along the bed of the oven, sprocket wheels over which said conveyor travels, a pusher pivotally mounted to move transversely of the active lap of said conveyor, a rotatable member operatively connected with one of the sprocket wheels, a projecting finger carried thereby, a cam connected with said pusher and projecting into the path of said finger whereby said pusher will be rocked on its pivot at each revolution of said finger, a spring for restoring said pusher to normal position, and means for preventing any bottles from being fed into the chamber while said pusher is being rocked.

Composition for Opal Glass. U. S. 1,419,032. June 6, 1922. Alexander L. Duval d'Adrian, of Washington, Pa.

The process consists generally in adding to the usual glass mixture, the double fluorides; of silicon, known as silicofluorides, of boron, known as borofluorides, of tin, known as stannofluorides, of zirconium, known as zirconofluorides, and of titanium, known as titanofluorides; with the fluorides of the alkaline earth metals and heavy metals. The inventor is aware that sodium silicofluoride has been used for this purpose, but has found that more satisfactory results are obtainable with smaller quantities, by using the complex fluorides of silicon, boron, tin zirconium, or titanium, with the fluorides of the alkaline earth metals or heavy metals. As examples of these complex fluorides may be mentioned magnesium silicofluorides, zinc borofluorides, lead zirconofluorides, barium stannofluorides or aluminum titanofluorides. These complex fluorides may be used separately or mixed with others.

An example of a glass mixture or composition using these materials is as follows:

Sand	1,000			pounds
Soda ash	350			"
Feldspar	200	to	300	"
Magnesium silicofluoride	5	to	50	"
Barium stannofluoride	5	to	50	"

The magnesium silicofluoride and barium stannofluoride can be varied in quantity according to the desired results, and may be replaced in whole or in part by the silicofluoride, or stannofluorides, of any of the other alkaline earths or heavy metals, or by the corresponding borofluorides, zirconofluorides or titanofluorides.

A further example of a glass mixture embodying the invention is as follows:

Sand	1,000			pounds
Soda ash	350			"
Feldspar	200	to	300	"
Barium stannofluoride	5	to	50	"
Lead zirconofluoride	5	to	50	"

The inventor has found that satisfactory results are obtained by employing a complex fluoride of an amphoteric element with either an alkaline earth metal or a heavy metal. Also the fluorides above described, may be used with both the alkaline earth metals and the heavy metals.

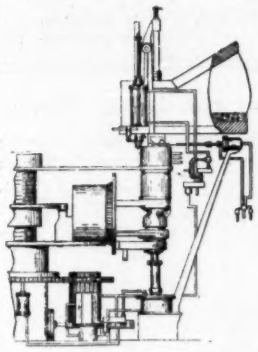
The inventor regards the complex fluorides of silicon, boron, tin, zirconium, and titanium, with the fluorides of the alkaline earth metals or the heavy metals, as the chemical equivalent of each other, and by claiming any one, contemplates covering the use of all.

Process of Purifying Sodium Carbonate. U. S. 1,419,463. June 13, 1922. Frank H. Merrill, of Los Angeles, Cal.

In the processes of manufacture of sodium carbonate and sodium bicarbonate from natural saline waters, there is usually present in the final product a small percentage of carbon or carbonaceous matters that gives the final product a grayish appearance; whereas the pure product is clear and white in appearance.

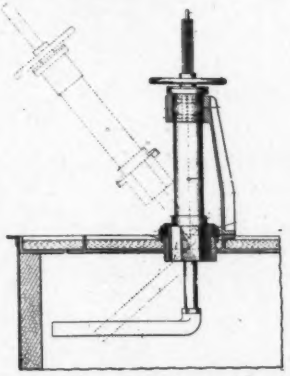
It is the object of this invention to provide a process of removing the carbonaceous and other oxidizable matters without heating the mass to the fusion point of the carbonates.

Glass-Flow-Off Controller. U. S. 1,413,183. April 18, 1922. Frank O'Neill, of Toledo, Ohio. This invention has utility when incorporated in control needle, plunger, and piston devices especially as adapted to cooperate from a glass tank region, to coact with an orifice or outlet.



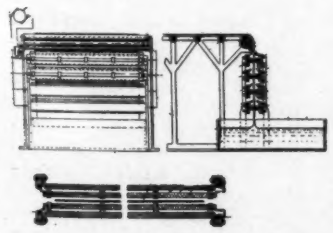
Among the inventor's claims is the combination with a container for a pool of molten glass, said container having an outlet for the glass below the surface of the pool, of controlling means for said outlet comprising a support, a refractory plunger projecting downward into the pool and having an intermediate heat weakened portion, said plunger embodying an upper portion sustained by the support independently of the portions therebelow, said upper portion having a central passage therethrough to a lower portion having a threaded seat, a reinforcing stem for the refractory having threaded engagement with said seat, a heat expansion take-up spring about the stem, said spring being sustained by the support for yieldably maintaining the plunger refractory portions assembled therewith, said upper held refractory portion relieving the heat weakened intermediate portion from crushing strain and the stem carried lower portion relieving the heat weakened intermediate portion from tension strain thereby distributing the load of the plunger, and means for shifting the support to vary the submergence of the plunger in the pool and normally maintaining the support in plunger sustaining position.

Poker for Gas Producer. U. S. 1,419,342. June 13, 1922. Edgar H. Wilson, of Chartiers Township, Allegheny County, Pennsylvania, assignor to Taylor-Wilson Manufacturing Company, of McKees Rocks, Pennsylvania.



Objects of the present invention are to provide a poker which is readily removable for repairs or other purposes; an improved construction facilitating the cooling of the operating parts; a construction which may be easily applied to standard producer installations; improved means for sealing the poker mechanism to prevent the escape of valuable gases from the interior of the producer; a poker mechanism which will not be affected by tar and heat.

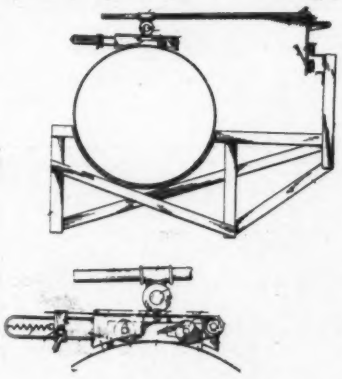
Automatic Electric Heating Device for Glass Furnaces. U. S. 1,420,181. June 20, 1922. Walter G. Clark, of New York, N. Y.



This invention relates to a heating device for maintaining a high temperature within narrow limits of variation in connection with the forming of sheet or window glass by the lifting or continuous process, by which method a continuous sheet of glass is drawn up from a tank containing molten glass. It is necessary to maintain this sheet at a temperature which will permit the sheets to pass over rollers and into the annealing lehr.

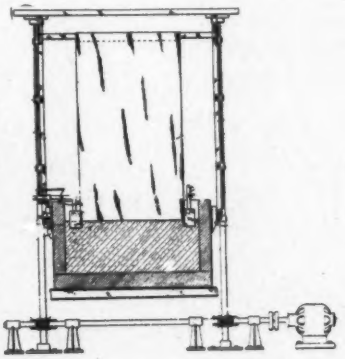
The object of this invention is to maintain the sheet of glass at the desired temperature between the surface of the molten glass in the tank and the surface of the roller over which the glass passes en route to the lehr.

Glass-Cylinder Cutter. U. S. 1,420,867. June 27, 1922. John R. Scohy, of Okmulgee, Oklahoma.



This invention has for its object to provide a cutter for cutting glass cylinders. Such cylinders are formed in the manufacture of window glass and other glass articles. The cylinders are cut into suitable lengths for the purpose of flattening. The invention provides a means whereby two or three cutters may be used and operated by one operator. Each cutter has a high resistance wire which is heated by an electric current and means is provided whereby the wire may be readily placed in position and its tension maintained to keep it in contact throughout its length with the glass cylinder notwithstanding its expansion. Also means is provided for readily placing, removing and supporting a plurality of cutters.

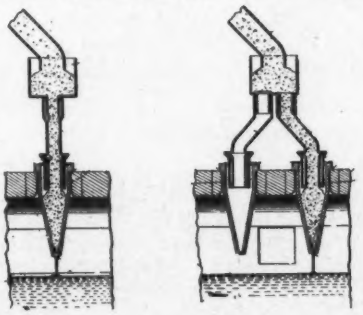
Sheet-Glass Drawing Apparatus and Method of Drawing Glass. U. S. 1,420,868. June 27, 1922. John R. Scohy, of Okmulgee, Oklahoma.



This invention has for its object to provide a means for efficiently and rapidly drawing sheet glass.

The inventor claims for the invention a method of drawing sheet glass, which consists in drawing the glass substantially vertical in sheet form and maintaining the edges of the sheet substantially in parallel relation by feeding the glass to the edges through slotted bodies, and turning the glass over a member and shearing the turned portion of the glass at a point near the member and raising the member and the glass to form a succeeding sheet. Also a bar for receiving the plastic end of a sheet of glass, threaded members for raising the bar to draw the sheet glass from the molten glass, a rack for receiving the bar and the drawn sheet glass and rotating the drawn glass into a horizontal position, a knife for severing the drawn glass.

Method of and Apparatus for the Manufacture of Glass. U. S. 1,421,210. June 27, 1922. Robert Good, of Washington, Pennsylvania, assignor to Hazel Atlas Glass Co.



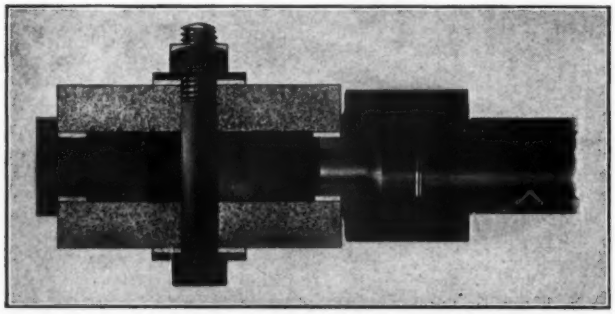
This invention comprises a method and apparatus for introducing raw materials into a glass melting furnace whereby the materials are fed into the furnace in a partially fused state, thereby accelerating the fusion of the glass and resulting in the production of glass of an improved quality.

Glass Factory Equipment and Supplies

THE GLASS INDUSTRY will be glad to publish descriptions of new and useful devices, machinery and supplies of interest to the glass manufacturing trade. Most of the information printed in this department comes direct from the manufacturers of the products described.

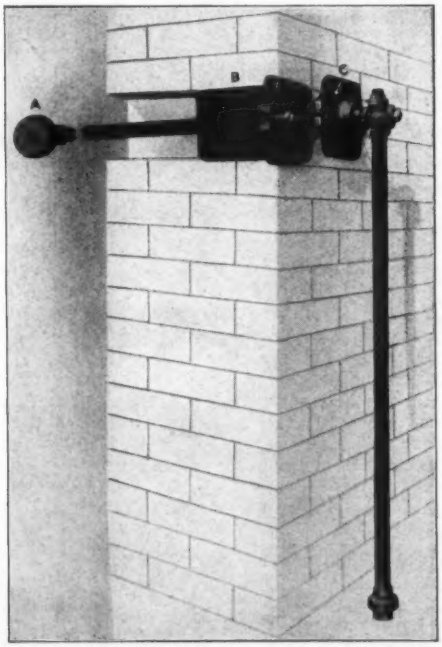
Flue Gas Filter for CO_2 Equipment

After much experimenting the Uehling Instrument Company, Paterson, N. J., has brought out the "Pyro-porus" Gas



SECTIONAL VIEW OF DOUBLE DISC TYPE "PYRO-PORUS" GAS FILTER

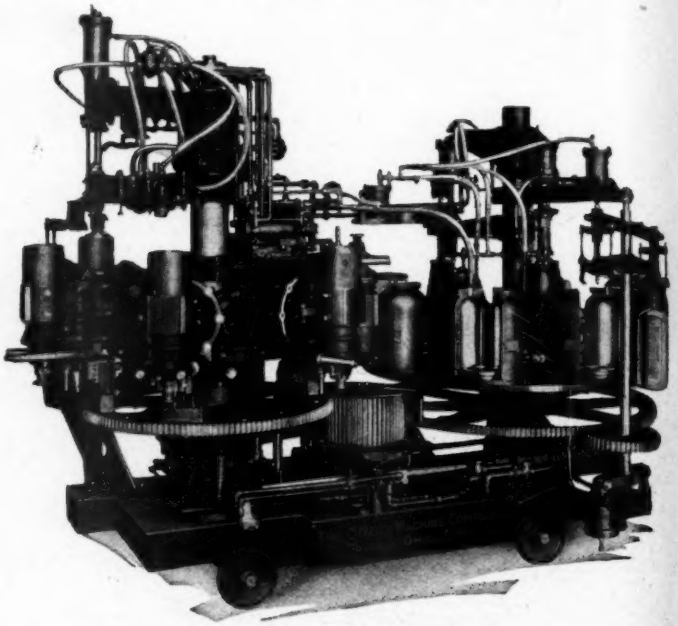
Filter by means of which, it is claimed, all dust and soot is completely excluded from the gas sampling lines. This filter is placed on the inlet end of the line, inserted in the flue or last pass of the furnace. The filter consists of two heavy but highly porous discs held in a casting by means of a bolt. With this apparatus the soot builds up on the filter, not entering the pores to any extent. Blowing out of the pipes at intervals becomes unnecessary. Provision is made in the pyro-porus filter by means of a frame, marked B in the illustration, and a holder C for facilitating inspection and making replacements should they become necessary. The manufacturer makes a definite guarantee as to the performance of this device.



SAMPLING PIPE HOLDER "C" UNBOLTED FOR REMOVING "PYRO-PORUS" GAS FILTER "A" HERE SHOWN IN VERTICAL POSITION

New Automatic Machine for Large Ware

A new automatic machine built for the manufacture of large ware and which will make the standard gallon packers, has been perfected by The O'Neill Machine Company, Toledo, O., thoroughly tested out in a glass factory and is now offered to the trade for prompt delivery. The machine embodies all the latest O'Neill improvements including the new patented take-out. It carries 6 blank molds and 8 blow molds.



O'NEILL AUTOMATIC FOR LARGE WARE

The manufacturers state that this machine is especially adapted for use with any standard feeder, and it is believed will fill the long felt need for an automatic machine for the manufacture of ware such as large sodas, water bottles, half gallon and gallon vinegars, ciders, etc. The type of bottle shown in the illustration was made at the speed of 11 per minute.

New Cleaner for Glass

A new cleaner for all kinds of glass and glassware has been put on the market under the name "Tippit," by the Claxton Sales Corporation, 54 Market Street, Paterson, N. J. It is claimed by the company that this is the most efficient cleaner marketed in bulk today and that its use effects a saving in both material and labor. Many cleaners on account of their caustic nature, are injurious to the articles to which they are applied; others, because of inert materials used in their composition, require a very large amount to do a little work; others appear to work well because they create a lot of suds, but suds alone do not clean. Suds have no cleansing power, and serve only to absorb the dirt after the other ingredients have loosened it, and to get rid of the suds, a great deal of unnecessary labor is required.

Tippet does not make suds. It is said to be an ideal cleaner for bottles, cut glass, tableware, etc., and for factory windows, fittings, etc. It is used also by hotels, hospitals and industrial plants for floor and general cleaning purposes. The Claxton Sales Corporation not only make "Tippit" but also cleansers for all industrial requirements, manufactured under the supervision of one of the foremost experts in this line.

"Don't Try to Carry the Whole World on Your Shoulders!"

"All around you are folks just as smart as you are—Concentrate on the thing *you* know best—and let others do the same"

From an Interview with Michael J. Owens

By KEENE SUMNER

(*Abstracted and reprinted by permission from The American Magazine, July, 1922, issue*)

As I sit down to write this article, there are three vivid pictures in my mind: One of them is a man. One is a machine. Both of these I have seen—the man, and the amazing mechanical creation which exists, and which has revolutionized a whole industry, because of this man's inventive genius.

But the third picture is of a boy I never saw, except in my mind's eye, for it is fifty years since that boy was a reality. Yet the picture of him as he was then, ten years old, "firing in the glory hole" of a glass factory at Wheeling, West Virginia, is as vivid to me as is the man he has become and the machine he has created.

And here is a curious and impressive thing: The machine which bears this man's name, perhaps the most marvelous machine in the world, has practically eliminated child labor in the glass industry; a result which will seem to many persons the greatest thing it has accomplished. Yet its inventor, who himself worked as a child in a glass factory, would not wipe that early experience out of his life, even if he could.

"YOUNG or old, work doesn't hurt anybody," says Mr. Owens. "It's the various kinds of foolishness which people pile on top of work, that hurts them."

Anyone who knows anything about the making of glass will realize that the man I refer to is M. J. Owens, of Toledo, Ohio. The Owens bottle machine is one of the great marvels of modern industry, an appalling creature with 9,576 separate parts.

One man wrote of it: "I have never seen anything which gives so exactly the appearance of an angry—even malignant—idol."

It feeds itself with a fiery fluid of molten glass; sucks it up methodically, clutches it with iron hands, blows its breath into it, releases its grasp, nonchalantly drops a finished bottle—and moves on to take another fiery gulp. At the rate of 150 bottles a minute—for it has fifteen mouths and arms and pairs of hands—it goes on. It is a monster weighing over one hundred thousand pounds, and ten feet high.

In one way, the thing is appalling; but that is not what I was thinking as I watched it work. It is the most perfect symbol of any kind of achievement. The whole story is there: the slow growth from a small beginning—for the machine started as a crude little contrivance invented almost 30 years ago; the patience and perseverance; the succession of disheartening failures; the courage to go on, and on, and on; the unceasing concentration on a single purpose; and the final fact that no great achievement is made singlehanded—always it is the product of many men working together.

"I was born in Mason County, West Virginia," said Mr. Owens, "and my father was a miner. I wasn't. But I worked at a job that I guess was just as hard. We moved to Wheeling when I was 10 years old; and as my folks were poor and we had a large family I went to work in a glass factory.

"At that time, bottles were made by hand. The workman would blow a bottle, and then it had to be reheated so that the rim at the lip could be formed. To do this, the bottle was held with what were called snaps and thrust into a small round furnace in a pit. Boys were hired to feed the coal into this furnace. The furnace was called 'the glory hole.' And the boy's job of shoveling coal down in this furnace was called 'firing in the glory hole.'

"That was my job when I was ten. I worked five hours in the morning; and when I came up out of the pit I was as black as that ink there. I went home, washed clean, ate my dinner, and went back for another five hours in the afternoon."

"Pretty strenuous work for a boy," I said. "But it doesn't seem to have hurt you."

"*Work never hurt anyone!*" was the emphatic reply. "The conditions under which you work may hurt you. You will suffer if you don't get enough food and sleep for the rebuilding and rest you need. Worrying over your work will wear you out. But the hard work I did as a boy never injured me. I went to bed early and I went to sleep without losing a minute. I wish I could sleep now as I did in those days! Summer evenings we used to play out of doors for a while after supper; but we went to bed early even then.

"I believe that every man who has accomplished anything will tell you that his early training had a good deal to do with it. My father was a sort of genius. He could build anything, from a wheelbarrow to a boat. That's what he loved to do. He would make a wonderful kite and be out flying it, a group of delighted children around him, when he ought to have been at work. That's why we were poor. If he had happened to get into the kind of work he loved, things probably would have been different. But he didn't; and he lacked the initiative, or the understanding, to find the right place for himself. He worked at the thing he hated and played at the thing he loved; and that's a bad program for anyone.

"But I suppose I got from him my inventive instinct, so I have that to thank him for. My mother was entirely different from him. She was a woman of great practical sense, of great energy and purpose. Perhaps I inherited from her some of these qualities. Certainly I owe more to her training than to anything else.

"In the factory, I went through all the jobs which boys performed; and I enjoyed every bit of the experience. I wanted to learn everything there was to be learned. And as there were no unions then to put obstacles in my way, I did learn every step of the process; and at fifteen I was a glass blower, working alongside of men two or three times my age. That was the situation until 1888, when I was twenty-eight years old.

"At that point, Edward D. Libbey came into my life. Mr. Libbey had inherited a glass business at East Cambridge, Massachusetts, from his father. But to compete with other concerns he was forced to move his factory nearer a cheap fuel supply, and to get a force of up-to-date workmen. He chose Toledo as his new location. And he went to Wheeling for his workmen. I was one of them.

"A friend of mine, older than myself, was engaged as superintendent, but later decided to stay at Wheeling, so I wrote to Mr. Libbey and asked for the position myself.

"I had become a glass blower when I was fifteen. Now, thirteen years later, I was still a glass blower. I didn't think much of that as progress. Furthermore, the work was irregular. If production stopped for a day, or a week, my earnings stopped too. I wanted to be on a salary.

"In answer to my letter, Mr. Libbey wrote that he thought he would first try out one of his old men as superintendent; but that, if this arrangement failed, he would consider my application.

"In August, 1888, I started work at Toledo as a glass blower. From the very first, I knew that the superintendent would not be a success. He was too old a man to take up new methods. He was incapable of handling men who did not know him and who did know far more about the new methods than he knew. Within three months, the workmen were pretty badly demoralized. They were drinking too much, they were slacking their work, and they had lost respect for the man over them. In November, Mr. Libbey let this man go and put me in as superintendent.

"The process of making bottles had changed less than almost any other mechanical process. Up to 1890 bottles were made almost exactly as they were two thousand years ago. But in the early nineties certain mechanical helps took the place of hand labor; and I, in common with many practical glass men, was interested in these semi-automatic processes.

"But it was not until 1899 that I began working on a machine which would be absolutely automatic, performing the entire process without the intervention of human hands. You would laugh at the first device we made; but the basic idea was there. The giant machines we build now have grown out of that idea.

"You start with *one thing* you want to do. That is the basis of every achievement. The first thing I wanted to do was to get molten glass from a tank into a mold without having a workman take it on a hollow rod and blow it into the mold. There was a definite proposition to work on. I couldn't let it flow into the mold. It would form a solid mass if I did. I must get air into it, if I wanted to make a bottle. What I did was to fix up a piston-pump, such as is used now for blowing up the rubber tires on your automobile. It was used then for bicycle tires. This gathered the molten glass, by suction, into a mold. I won't go into technical details, but the mass of glass was then inserted in a second mold, and the piston pushed forward, forcing the air into the glass and forming the bottle.

"They were queer-looking bottles at first, to be sure. But we had proved that the principle would work. To make it work better was the next thing to be done. And that is the way the machine has grown. Always it was a question of taking *the next step*. We are still finding new steps to be taken. And that, too, is the history of all achievement. Nothing is ever finished and done with. Occasionally it may seem to be, because something different takes its place. But the 'something different' is always somehow a continuation and an outgrowth of what is discarded.

"Everything you do suggests something else to be done. When we got to making bottles pretty fast, we had the problem of getting them to the annealing ovens. So we devised automatic 'lehrs'; and now a bottle is not touched by human hands from the time it is molten glass, revolving in a huge tank, at a temperature of from 2,000 to 2,500 degrees Fahrenheit, until it emerges from the annealing oven, one of hundreds in regular rows, all tempered to an exact degree."

"Why do you say 'we' did this and 'we' did that?" I asked. "Did others have a hand in developing the machine?"

"Did you ever know of anything in the world that was solely and entirely the work of one human being?" demanded Mr. Owens. "Even the raw materials we work with are contributed by others. It is a case of give and take all the time. How were my early experiments made possible? Because of Mr. Libbey's backing. How were the machines introduced? Because he furnished the capital. We always have had engineers to help work out the mechanical problems. We have bought other men's ideas when they would be useful to us. And so it goes. The basic ideas were mine. The patents are in my name. But the achievement is like the machine itself. That has thousands of separate parts; it is not one piece of metal. And any big achievement has thousands of parts, each representing someone who has had a hand in it.

"You see, it is the same story of how one man's achievement is helped along by others. You've heard often enough that 'no man liveth to himself alone.' It is just as true that no man *achieves* by himself alone. The other fellow has a share in it. The danger is in getting to think that you are 'the whole works.' Nobody is.

"We need not be afraid that the world will suffer for want of our ideas about improving it. We need not carry the whole burden. The world is full of folks just as smart as we are. I believe in concentrating on one thing. I'd rather ride on a train where the engineer was satisfied to run the engine and did not want to go back and show the conductor a new scheme for taking tickets, even if his ticket scheme was a better one."

"It's rather a curious thing, but even when I put money into other men's enterprises, I lose. Somehow these investments turn out badly. People talk about not putting all your eggs into one basket. Well, you know what Carnegie said: 'Put all your eggs in one basket—*and watch the basket!*' He practiced what he preached, too. The thing he knew was steel; and he put his money into the steel industry. The thing I know is glass. I've lived with it and studied and worked over its problems all my life. Wouldn't it seem to be plain common sense for me to put my money and my efforts into it?

"Of course that doesn't apply to anyone who has no special knowledge of any one business."

"How about retiring?" I asked. "Do you want to give up active business life? Are you still working, yourself, to make your machine better?"

"To answer your last question first—yes. That is part of the necessity of watching the basket where all your eggs are. It's a good deal like this: When I was younger, I wanted to invent new methods, partly from an impulse toward creating something new; and partly, in my case, because I wanted to help build up the business. But building up a business is only the beginning of the struggle. Your competitors are working to build theirs up, too. Other men are inventing new methods. For purely business reasons, you must keep on trying to stay in the lead. If you sit still and drift, others will soon forge past you. So I keep on, because of that.

"But this isn't the only reason. Perhaps it isn't even the real reason. As I said before, nobody is 'the whole works.' One man dies, or steps aside, and somebody else takes his place. The 'somebody else' may be even better than he was. The real reason I keep on is because I like to. I *want* to work. It is the most interesting thing in the world and it is the most constructive thing. I've enjoyed fifty-two years of it and I hope to enjoy a good many more. I don't stick to it as closely as I once did, although I don't know that I feel any better on that account. Work never hurt anyone."

The Simplification and Standardization of Bottles

The meeting of the Proprietary Association on May 7, 1922, at Hotel Astor, New York, was addressed by M. J. Owens, vice-president, The Owens Bottle Company, Toledo, Ohio, who after expressing pleasure in having the privilege of talking on a vital subject that concerns not only the user of bottles, but the manufacturer as well, spoke as follows:

"It is only proper for me to say to you in the beginning that I am not here for any selfish purpose. If I happen to allude to our particular case or our particular connection with the manufacture of bottles, I do it only for the purpose of illustration. The argument applies to everyone who is making bottles and we manufacture less than one-third of the 25,000,000 gross of bottles made in the United States each year.

"The most approved processes of manufacturing bottles, the automatic machine methods, are available to many concerns. We have no monopoly in the use of machinery and by far the greater proportion of bottles is made by automatic devices. What I have to say, therefore, pertains to all manufacturers and users as well, and the benefits of the proposal will likewise be equally distributed.

"I know you are all acquainted with the accomplishments of the last four or five years, due in great part to the War, in eliminating great waste of labor and material. It has been brought home to all of us that many things are done in manufacturing which are unnecessary and wasteful—things which add to the direct cost of manufacturing and to the trouble and difficulties of handling storage.

"Just at this time the Federal Government, through the Department of Commerce, is particularly active in helping manufacturers to escape these unnecessary difficulties and this great waste. It is making the full weight of its influence felt, in an effort to simplify and standardize the manufacture of all articles, wherever simplification or standardization is feasible and beneficial.

"When we entered the glass bottle field—about 1905—it was common practice to have everything connected with the manufacture of bottles crude and cheap. The factory buildings were cheap; the furnaces were cheap; but it was necessary to employ skilled labor to blow the bottles and that was expensive.

"It was customary in those days for small concerns to produce novelty goods, and to offer special inducements to the buyer to encourage their use. These evils developed in the bottle trade, as in every other line where the smaller manufacturers departed from the standard shapes.

"The introduction of bottle-making machinery brought about many improvements in the quality of bottles and made possible the use of other machinery for labeling, corking, etc., and all of the members of this Association have received the benefit of these improvements. In fact, the production of bottles has been so advanced by the use of machinery that there is hardly any comparison with former conditions.

"It is not necessary for me to relate at this time the detail of the progress we have made in the last few years. What I respectfully call to your attention today is the point that if these improvements are to continue, if the progress of machinery is to be as great in the future as it has been in the past; in brief, if the automatic manufacture of bottles is to succeed to the fullest extent, it will be possible only through the help of the individual user of bottles.

"A vast amount of capital has been invested in mechanical equipment. Great changes have been made in order to provide this industry with complete facilities for the mechanical production and handling of bottles. In order to give the buyer of bottles the full benefit of these improvements, we ask his co-operation to the end that we will have full sway in the use of machinery.

"Under present-day conditions, the old method of making novelty shapes for individual users is no longer practicable. The use of mechanical devices is so general; the quantities of bottles produced are so tremendous; the methods are so standardized; the fixed expense and overhead are so considerable, that the manufacturer should have the co-operation of the users to simplify and standardize the articles they demand. The discontinuance of novelty and special shapes and sizes, and the formation and acceptance of definite standards, suitable to all parties concerned will be a distinct step forward. In return, the manufacturer can and must give to the buyer of bottles, the benefit of these economies in the way of lower prices.

"Similar reforms have been completed, or are now in process, in practically all of the large lines of industry, and it is not too late to start in now in the bottle business.

"As an example of the needless expense and waste, our company alone, apart from its subsidiaries, has spent $900,000 for molds in the last five years. We estimate that this year we will spend $300,000 for new molds. It is clear that if this cost is felt so heavily in the case of a single company, it must bear down in still greater proportion upon the other glass manufacturers. Eventually, of course, all this expense goes into the cost of bottles and is absorbed by the users.

"It must be evident from what I have said, that the cost of making bottles is greatly increased because of the manufacture of individual designs. Among the number of men in this room who are buying bottles, we are quite certain to discover that many of them have their individual notions of what shapes their particular bottles ought to have, and naturally, do not fully comprehend what expense this means to the manufacturer. We have all the different shapes and all the different sizes to contend with, and all the other things that go into the making of a bottle. Then we have all the various types of closures, and when you add to this the desire of manufacturers here and there for bottles with individual characteristics, our difficulties are increased, and likewise, the cost is increased to an extent that the average buyers, engrossed in their own business problems, do not fully appreciate.

"To meet this desire for distinctive shapes, it is necessary for our Company to have over eight hundred different sets of molds in the prescription and proprietary lines alone.

"What we would recommend, is that every user of bottles who puts up one or more commodities, shall rely upon his label to distinguish them. In view of the legislation by the Government regarding quality and quantity of products, it does not seem to me that any other distinction in the package is necessary than that indicated on the label. I would then advocate the use of a round, or a square, or an oval bottle, in sizes ranging from the smallest up to the largest. I would rely upon these three styles to take care of the requirements of the trade and I believe they would be entirely adequate.

"There are other advantages which are shared in common by the manufacturer and the user. With standard shapes, a large variety of bottles will be eliminated. This will mean that the manufacturer can concentrate on the most practical shapes, can have long runs without interruption, and that the productive capacity of each unit is increased. It will mean that less warehouse space is required by the jobber and the user. It will mean that better service can be given, with a smaller stock of goods, and consequently, a lower investment cost. It will eliminate the slower moving package, and bottle stocks will be current, will move rapidly, and the rate of turnover will be increased.

"The obsolescence of novelty shapes, which have lost their appeal to the public fancy and which are an item of cost all around, will no longer exist. The crates and reshipping cases will be simplified correspondingly with the simplification of the bottle, and the same arguments which apply to the bottle will apply to the crates in which they are shipped.

"In brief, the simplification and standardization of bottles will extend to other articles used in conjunction with bottles, and will bring about such advantages from every standpoint that it appears to be very much in order for manufacturers and bottle buyers to give it careful consideration.

"Is such a restriction of styles practicable? Some people may think it is not, but if you will take into consideration a number of the highest grade of liquors or French wines, or the French cordials, no matter whether it is a pint bottle or quart bottle of champagne, whether it costs $6.00 or $10.00 a bottle—and the same is true of claret—you will find that there was no distinction in the bottle. No one ever looked at the shapes of the bottles because they were all the same, but they did look at the labels. Could there be any better example than that? If you want to know the quality of the goods you are buying, you do not look at the shape of the bottle but you rely upon the label, and that is sufficient.

"I might go on and talk here an hour about what has been accomplished in the other industries and the advantages to be obtained in our industry from uniformity in the shape of bottles, etc., but I am not going to do it. I have simply placed this matter before you from our standpoint and given you our idea of the situation. If every man who is using bottles will contribute his share to the progress of machine manufacture, by adopting uniform styles of bottles, and will depend upon his labels to show the distinctiveness of his goods, he will help advance the bottle business; and by reducing the various shapes, sizes and closures, will bring about a reduction in expense in every direction to the manufacturer, and in turn, this reduction in expense to the manufacturer will result in a reduced cost to the user. If this is brought about, I believe my appearing here will have been of some good."

EDWARD EVERETT HALE charted the course of industrial development when he said that the extent to which the world had changed the laborer who uses his body into the workman who uses his head was the index of civilization. The formula for modern industry is man plus mechanical energy, or better expressed, it is man multiplied by his machines. The true measure of industrial progress is found in the amount of mechanical power used to supplement man power.—GEORGE OTIS SMITH, Director U. S. Geological Survey in *The Nation's Business.*

The Glass World and What It Is Doing

News of the Industry Briefly Told

Ceramists to Enjoy Fine Summer Trip

Members of the American Ceramic Society will gather at Rochester, N. Y., on Sunday, August 13, to begin the Summer Excursion Meeting which will take them as far east as Montreal and back by easy stages through several Canadian towns and cities to Niagara Falls and Buffalo.

Leaving Rochester on Sunday night by boat, the party will arrive at Montreal the following evening after passing the Thousand Islands, "shooting" the St. Lawrence rapids and experiencing various other thrills while navigating the beautiful and interesting river.

On Tuesday, G. Percy Cole of the Dominion Glass Company will take charge and conduct the party through their bottle factory at Point St. Charles, which is equipped with Owens machines, and the company's Delorimiert works, where punch tumblers, chimneys, etc. are produced. The party will also visit the Consumers Glass Company where semi-automatic machines will be seen at work on bottles and tumblers.

A trip will be taken to the Laprairie works and the Delson Junction works of the National Brick Works, the enameled ware factory of Thos. Davidson Manufacturing Company, Ltd., the Gurney Foundry Company's stove enameling plant, and the Canada Cement Company, Ltd.

On Wednesday the Derry feldspar quarries of O'Brien and Fowler, at Buckingham, Ontario, will be shown to the members, and in the afternoon they will proceed to Ottawa, and make headquarters in the Chateau Laurier. Thursday morning will be spent in visiting the Parliament Buildings and other points of interest, after which the party will leave Ottawa, stopping at Verona to visit the famous feldspar quarries of this district, and arriving at Kingston in the evening. Late in the evening a special Pullman sleeper will be boarded for Toronto. In that city on Friday the members will visit the Jefferson Glass Company's factory and the Dominion Glass Company and other points of interest. On Saturday the excursionists will go to Hamilton to see the Dominion Glass Company's local plant and inspect the new works of the Libbey-Owens Sheet Glass Company, and other ceramic industries, leaving Sunday open for an optional visit to Niagara Falls or for the return home of those members who wish to take that course. It is evidently going to be a week crowded full of enjoyable and interesting experiences. Detailed information regarding the trip, may be obtained from Ross C. Purdy, general secretary, Lord Hall, O. S. U., Columbus, Ohio, or from Millard F. Gibson, 32 Toronto Street, Toronto, Ontario.

The Arsenic Situation

During the last few weeks there has been an acute shortage of both white arsenic and calcium arsenate. Usually the arsenic season extends from November to March but this year there has been an abnormal demand from the insecticide consuming districts, particularly in the cotton growing regions.

While the abnormal demand from the insecticide trade is doubtless the principal cause for the arsenic shortage, there are a number of contributing factors. The reduced output of copper (and consequently of domestic byproduct arsenic), and the decrease in imports from Mexico and Japan are most important. Neither Germany nor England have been a factor in the arsenic market for at least 6 years.

PRODUCTION AND CONSUMPTION

The maximum annual consumption of white arsenic in the United States was in 1920 when it was estimated that approximately 15,000 tons were used. In 1921 this dropped to not more than 9,000 tons. It is difficult to estimate the amount of white arsenic consumed in the United States because of its wide variance—from 3,400 tons in 1904 to 15,000 in 1921. The following figures, estimated by a leading factor in the industry, are believed to be as accurate as are available:

	Tons
By the glass manufacturers.....	2,500 to 3,000
Sheep and cattle dips, approximately..	1,500
For dyes, pharmaceutical and other purposes, approximately:.....	500
In the manufacture of lead and calcium arsenates, insecticides, and weed killers, approximately.....	5,000 to 9,000

Prior to 1914 by far the larger share of arsenic used in this country was imported, principally from Japan.—*Chemical & Metallurgical Engineering.*

Chemical Exposition Plans

Preparations are well advanced for the Eighth National Exposition of Chemical Industries to be held in the Grand Central Palace, New York, during the week of September 11. As usual on this annual occasion there will be a great gathering of scientific and technical men, and prominent speakers, including Herbert Hoover, Secretary of Commerce, will address meetings of the numerous organizations which will be held in connection with the Exposition. The American Ceramic Society will have a booth on the exhibition floor for the convenience of members who may wish to make it their headquarters. The Salesmen's Association of the American Chemical Industry will hold meetings and other organizations whose interests touch the glass manufacturer will be there. The program is not yet completed but will include an address by Judge I. G. Jennings, business director of the Glass Container Association, on "The Reasons for the Varieties of Shapes and Sizes." Over 400 concerns will exhibit their products, including the following which produce glass or cater more or less to the glass industry:

Armstrong Cork & Insulation Co., Bailey Meter Co., Bausch & Lomb Optical Co., Bristol Co., Brown Instrument Co., Carborundum Co., Celite Products Co., Corning Glass Co., Charles Engelhard, Inc., General Electric Co., Hardinge Co., Innis, Speiden Co., Johns-Manville Co., Leeds & Northrup Co., Mathieson Alkali Co., Mono Corporation., New York Continental Jewell Filtration Co., Norton Co., Quigley Furnace Specialties Co., Permutit Co., Pennsylvania Salt Mfg. Co., B. F. Sturtevant Co., Surface Combustion Co., Thwing Instrument Co., Uehling Instrument Co., Union Sulphur Co., Westinghouse Electric & Mfg. Co., Whitall-Tatum Co., Wilson-Maeulen Co.

Among the other associations besides the American Ceramic society which will have booths are the Chemical Club, the Container Club. the National Lime Association, and the Talc and Soapstone Producers Association.

Flint Glass Manufacturers Convention

The American Association of Flint & Lime Glass Manufacturers met in annual convention at Atlantic City on July 21, President Marshall W. Gleason of Gleason-Tiebout Glass Co., Brooklyn, N. Y., making the opening address. Mr. Gleason touched on various subjects, dwelling particularly on the detrimental effects of strikes upon industry and industrial workers, and saying:

> "To me the strike is one of the most terrible features of modern industry. When will we learn to conduct our affairs so that such terrible losses and the resulting inconvenience will no longer be visited upon our people? I do not think you quite realize it, but we men in the glass business set an example for all industry, not only here in America but the world over. The possibility of industrial peace lies only in some such plan as we have been following for many years. I refer to our Annual

Conference between the workers and the manufacturers at which all difficulties are adjusted and all our little quarrels settled in a friendly way without even the possibility of a strike being considered by either sides to the controversy."

Mr. Gleason felicitated both manufacturers and workers on the glass industry's record of 35 years without a general strike.

Routine matters were disposed of and the election resulted in the re-election of all of the old officers with the exception that Marion G. Bryce was made first vice-presdient, and Nicholas Kopp second vice-president. About 25 manufacturers were represented at the convention.

Window Glass Meeting at Cedar Point

The members of the National Association of Window Glass Manufacturers having indicated Cedar Point, O., as their choice of all the places considered for holding the annual meeting, the committee has acted accordingly and set the date for the meeting there as August 8 to 10, 1922. A. Q. Tallant, traffic manager, has issued for the convenience of members a schedule of passenger rates from various points to Cedar Point and return.

Among the speakers announced are T. W. Camp, president of the Association, H. C. Robinson, of Cleveland Trust Co., Cleveland; H. L. Dixon, of H. L. Dixon Co., Pittsburgh; Ross C. Purdy, general secretary, American Ceramic Society; A. H. Chandler, refractories department, Pittsburgh Plate Glass Co., Pittsburgh; Frank Bastin, Blackford Window Glass Co., Vincennes, Ind.; John B. Yates, Premier Window Glass Co., Pennsboro, W. Va.; L. E. Partridge, Sharp, Partridge & Co., Chicago; J. N. Seimer, National Window Glass Workers; H. B. Hudson, Window Glass Cutters' and Flatteners' Association; N. E. Dunn, Window Glass Cutters' and Flatteners' Protective Association.

Miscellaneous Items

The Glass Container Association has been given the privilege of addressing the audience of "WJZ" radio station of the Westinghouse Electric Company at Newark, N. J., and the voice of Judge I. G. Jennings, business director of the association will, on August 7 be heard from Maine to California, sound-waving through space his favorite theme—the superiority of the glass container over all others—so that all who will may hear. So "tune in to 360 meters, point your finder toward Newark, N. J., be sure your battery registers 1280, have your spare 'phones and amplifiers all hooked up and invite your neighbors to listen-in at 6.30 p. m., Eastern Standard time, August 7, 1922."

The American Flint Glass Workers' Union at their annual international convention at Fairmont, W. Va., approved the enactment of a tariff measure based on the American valuation plan, and adopted resolutions approving the three-shift-system as a means of taking care of the men who are being displaced by machinery. Various committees adopted resolutions protesting against further wage reductions. Baltimore, Md., was selected as the meeting place for the 1923 annual convention. The national officers including President Wm. F. Clarke, vice-president Joseph Gillooly, secretary-treasurer Chas. J. Shipman and assistant secretary Harry H. Cook were re-elected.

The volume of building permits filed in June in 141 cities in the United States as quoted by *Bradstreet's*, totaled $218,674,449 as against $127,671,278 at the same cities in June a year ago, an increase of 71.3 per cent. Construction contracts awarded in the five boroughs of New York City during the first six months for this year have amounted to $305,720,400, according to F. W. Dodge & Co. This is more than double the amount for the first half of 1921. Construction for the first half of the year in the 27 northeastern states exceeded that of 1921 by 59 per cent.

The officers of the National Lime Association, elected at the recent annual convention at Cleveland, O., to serve for the 1922-1923 term, are as follows: President, Charles Warner; vice-president, George Nicholson; treasurer, Milton McDermott; secretary and general manager, N. G. Phillips. M. A. Holmes was re-appointed manager of the chemical division. R. R. Shively, of the Monongah Glass Company, Fairmont, W. Va., addressed the meeting on the use of lime in the glass industry. His paper appears on another page of this issue.

More American Members.—Since the publication in the July issue of the names of residents of the United States elected since January 1, 1922, to membership in the Society of Glass Technology, the following additional names of recently elected members have been furnished by F. Graves Clark, secretary of the Society.

Collective Members, Ohio State University, Columbus, O. Ordinary members, W. R. Smith, of Illinois Glass Company, Bridgeton, N. J.; Prof. C. W. Waggoner, West Virginia University, Morgantown, W. Va.; E. Wilson Heisey, of A. H. Heisey & Company, Newark, O.; R. D. Mailey, of Cooper-Hewitt Electrical Company, Hoboken, N. J.; J. P. Weaver of Libbey-Owens Sheet Glass Company, Charleston, W. Va., and I. L. Sills, of Consumers Glass Company, Montreal, Canada.

All of the above members were proposed or seconded for membership by the Society's American treasurer, Wm. G. Clark, Glass Technology Department, National Lamp Works of General Electric Company, Nela Park, Cleveland, O.

The Fall meeting of the American Chemical Society will be held at Pittsburgh, Pa., with the Pittsburgh Section, Monday, September 4, to Saturday, September 9, inclusive. Among the addresses to be delivered will be one by Dr. J. H. James, head of the department of chemical engineering, Carnegie Institute of Technology, on "Pittsburgh's raw materials and markets for chemical products." A gas and fuel section will hold its first meeting with A. C. Fieldner as chairman.

Glass indictments stand.—Federal Judge Ervin at New York on June 29 overruled the demurrer interposed by the 53 glass manufacturing corporations and about 53 individuals, including three labor leaders, in an effort to upset indictments returned last March charging violation of the Sherman anti-trust law by limiting the output and fixing the price of window glass. Government attorneys announced that the cases would be tried early in the Fall.

Data furnished by the **Illuminating Glassware Guild** to the Department of Commerce show that net orders on hand at the end of May, 1922, amounted to 45.5 per cent of capacity, compared with 37 per cent in May, 1921. Actual production was 45.3 per cent of capacity in May, 1922, against 31.9 per cent in May, 1921. Shipments billed in May, 1922, were 41.1 per cent of capacity against 30.8 per cent in May, 1921.

Exhibitors in the Lamps and Glassware Section of the National Merchandise Fair to be held at Grand Central Palace, New York, August 7 to 25, will include Corning Glass Works, William R. Noe & Sons, Will & Baumer Campbell, Gudeman & Co., Edmondson Warren, Art Metal Works, Spring Valley Wood Products Co., Maryland Glass Co., New Martinsville Glass Mfg. Co., Columbia Wax Works.

The Glass Bottle Blowers' Association at their forty-sixth annual convention at Bellaire, O., adopted resolutions in favor of legalizing the manufacture of light wines and beer, approved of old age pensions, re-elected all old officers and chose Chicago for the 1923 annual meeting. The wage committees prepared the demands to be presented to the manufacturers at Atlantic City in August.

The National Association of Manufacturers of Pressed and Blown Glassware wage conferences began at Atlantic City on July 24 and will continue until August 8, covering eleven trades in the following order: Hand and machine press, shade and globe, chimney, engraving, mold making, punch tumbler, cutting, paste mold, iron mold, caster place.

Serviceable surplus cars totaled 239,160 cars, for the week ending July 8th, of which 61,067 were box cars and 146,743 coal cars. This is an increase of 966 box, and a decrease of 815 coal, and 65 all freight cars compared with the week preceding.

The first glass works in Lithuania have been opened near Radviliskis. The sand in the neighborhood is very good for glass making, and the plant is said to be efficient and of considerable size.

Personal News

Fred H. Schwetye has accepted the position of secretary of the Grand View Fire Clay Company, St. Louis, Mo. He has been connected with Laclede Christy Clay Products Company for sixteen years, and during the last four years was general superintendent for Laclede plant and Christy plant of the Laclede Christy Company. Mr. Schwetye will be in charge of the mines and plants of the Grand View Company, who are manufacturing prepared mixtures for the glass, zinc and foundry trade, and also refractory materials.

Donald Robertson, until recently of the School of Glass Technology of the University, Sheffield, England, has become associated with John Lumb & Company, Ltd., Castleford, Yorks, glass manufacturers, in the capacity of assistant to the managing director and temporary chief chemist of the company's factories.

S. F. Cox, formerly assistant to the consulting engineer of the Pittsburgh Plate Glass Company, has accepted a position with the Calorizing Company of Pittsburgh, Pa., as chief engineer and will have direct charge of the Wilkinsburg, Pa., plant, in addition to other duties.

Robert L. Kight, formerly city salesman with the J. W. Coulson Company, Columbus, O., is now connected as local representative with the Ohio Plate & Window Glass Company, Toledo, O., jobbers of plate and window glass.

William E. Ford, president of Ford-McNutt Glass Company, Minneapolis, Minn., was elected president of the National Ornamental Glass Manufacturers Association at the recent convention at Cincinnati.

Irving E. Adams, consulting glass chemist, has moved from Reading, Pa., to 639 North Spring Garden street, Ambler, Pa.

Verified News of Trade Activities

The Refugio Glass Works, who will manufacture high pressure bottles, prescription ware, etc., 615 National Bank of Commerce Building, San Antonio, Texas, report that their plant at Refugio, Texas, is nearing completion and that most of the equipment, including lehrs, has already been installed. The company also states that they have made a ten year contract for natural gas for fuel at a cost of 10 cents per thousand cubic feet and that they have large quantities of surface silica sand 99½ per cent pure at their factory doors. The company was recently organized with a capital stock of $75,000 and the officers are: W. M. Stephenson, president; Chas. K. Finkbeiner, vice-president; James K. Naylor, secretary and treasurer, W. L. Napier, general manager, and John Finkbeiner, superintendent.

The **Miller Glass Engineering Company,** Swissvale, Pa., report making a shipment in July of a battery of four feeders to the Peerless Glass Company, Long Island City, N. Y. These will be used in conjunction with Lynch machines making a general line of pressure bottles. **William J. Miller** recently shipped to the Atlantic Bottle Company, Tarentum, Pa., for installation in their new factory, two latest improved model PC electrically operated machines which will be used with Miller Glass Engineering Company automatic feeders on milk bottles, tobacco jars, etc. The Lamb Glass Company, of Mt. Vernon, O., have placed a repeat order for three additional eight mould model Miller PC electrically and air operated Geneva movement machines for installation in their new factory. These machines are of massive construction, weighing approximately ten tons each. They will be utilized in the manufacture of milks, operating in conjunction with the Miller Glass Engineering Company's automatic glass feeding device.

Bridgeville Glass Division, National Lamp Works of General Electric Company, Bridgeville, Pa., on July 8 dedicated the fine new three-story building recently erected for the welfare of the employees of the plant, the ceremonies including an address by Dr. Charles A. Eaton, of New York, welfare director of the General Electric Company. The new building contains a cafeteria, rest rooms, doctor's and dentist's offices, nurse's quarters and first aid equipment, men's smoking and card rooms.

Plate Glass Machine Company. Application is to be made by Charles A. Grice, James Carrie, F. E. Troutman and W. D. Sawyer for a Pennsylvania charter for the Plate Glass Machine Company, Butler, Pa. The object of the business will be to create, purchase and own patents for manufacturing machinery and appliances for making, grinding and polishing flat and plate glass, and the granting of licenses to others to manufacture and use such machinery.

All of the glass casket companies organized to operate under the De Camp patents in the United States are, according to a report issued to stockholders, combined under the name **De Camp Consolidated Glass Casket Company,** whose main office is at 1465 Broadway, New York. J. W. De Camp is president of the new corporation, which has an authorized capitalization of $25,000,000 common stock, par value $10 per share.

Following a fire at the Glassmere, Pa., plant of the **Allegheny Plate Glass Company** in June, the *Journal of Commerce,* New York, gave out figures showing that the plant was covered by insurance to the amount of $1,900,000, carried in 76 different companies whose policies varied from $2,250 to $105,000 each. The insurance loss resulting from the fire mentioned above was $30,947.

The stockholders of the **Elk Run Window Glass Company,** Punxsutawney, Pa., at a recent meeting elected the following officers and directors: Adolph Wazelle, Jr., president; Caspar Kopp, secretary; Raymond DuBois, treasurer; directors, Emile Laurent, George W. Stevenson, Stanley Reams, Rene Wazelle, Fernand Wazelle, George Tomer, A. C. Wargny, and Oscar Wargny, who is also manager of the plant.

The **Vitrolite Products Company,** 218 North Union avenue, Chicago, Ill., has been incorporated with a capital of $100,000. The company has the sale rights to Vitrolite, a white opaque glass made by the Vitrolite Company, Parkersburg, W. Va., in Chicago and adjacent territory. The incorporators are: F. J. Downs, J. F. Hardin, B. F. Damon, D. S. Beebe and T. C. Downs.

The property of the **Lynchburg Glass Company,** Lynchburg, Va., was sold at public auction on June 29th to a creditors committee, who will resell the property at private sale, or lease it to some glass manufacturer for a term of years. The chairman of the committee is John Victor, president, Peoples National Bank, Lynchburg, Va.

The following concerns have recently been granted charters: **Delmar Bottling Company,** Bethel, Del., manufacture glass bottle containers, corks, etc., capital $100,000; **Handy Glass Company,** Philadelphia, Pa., glassware, capital $200,000; **Southern and Western Glass Products Company,** Wilmington, Del., manufacture coffins, caskets, capital $2,500,000.

The Standard Plate Glass Company, Butler, Pa., is erecting a one-story brick and steel building, 100 by 280 feet to be used for a wareroom and packing, cutting and shipping departments. The approximate cost of the structure will be $100,000. The Standard company report that they are at present working 100 per cent normal capacity.

Hagerstown Cut Glass Factory, Hagerstown, Md., are erecting a two-story addition, 30 by 40 feet, to their plant. When completed the addition will be used on the first floor for the beveling plant and on the second floor for the cutting shop. The company will also install a silvering table.

A. J. Fallen, secretary, **Davies Glass & Manufacturing Company,** Wheeling, W. Va., advises that no negotiations are pending on the proposition of selling out the company to the Central Glass Company, also of Wheeling, as was recently reported in the newspapers.

A break in a tank at the plant of the **Wightman Bottle & Glass Manufacturing Company,** Parkers Landing, Pa., resulted in the shutting down of the plant until repairs are made, which will take about six or eight weeks. The plant employs about 125 men, boys and girls.

The **Spring City Bottle Company, Inc.,** West Chester, Pa., is having repairs made to a flue which recently collapsed causing a shut down of the plant. As soon as the repairs

are completed the company expects to operate 24 hours per day.

The **Crystal & Scientific Glass Products Company,** 99 Franklin street, New York, has been incorporated with a capital stock of $100,000, by F. and Z. Kafka, and G. C. Volz The company will manufacture glassware specialties.

The **American Window Glass Company's** box factory, carpenter shop and nearly 1,000,000 feet of lumber were destroyed at its plant at Arnold, Pa., on July 21. The estimated loss is about $180,000.

The Sigwart & Rolston Machine Works, manufacturers of sand blasting, glazing and cracking-off machines for lighting ware factories, are now located at 3145 Penn avenue, Pittsburgh, Pa.

The **Alley Glass Company,** Shinnston, W. Va., has been incorporated with a capital stock of $10,000 by L. E. Alley, P. E. Tetrick, E. A. Allen, Thomas Pittman, and H. E. High to manufacture glass.

The sand blast department of James Yocom & Son, Inc., Philadelphia, Pa., has been acquired by **H. B. Storey,** former manager of the department, and will be continued at 145 North Second street.

The Hygeia Glass Corporation, Lancaster, N. Y., are repairing their tank and replacing their pan lehrs with two eight-foot by sixty-five foot Simplex muffle lehrs.

The **Willetts Company,** manufacturers of clay products for glass factories, have changed their mail address from South Tenth street to P. O. Box 1047, Pittsburgh, Pa.

The **Interstate Window Glass Company's** Factory No. 3, at Clarksburg, W. Va., formerly known as the Tuna Glass Company, will start drawing glass August 15, with six Okmulgee machines.

Inquiries Received

For further information address THE GLASS INDUSTRY.

80.—Kindly give us the names of importers of windshield glass.

81.—We desire the names of firms that can quote on and furnish glass discs eleven inches in diameter, ground circular and with edge grooved and beveled.

82.—Who builds lens grinding machinery?

83.—We have read with marked interest the article in the June issue entitled "Electrical Removal of Dust from Producer Gas" and would like very much to be put in touch with the makers of the Cottrell-Moeller precipitator.

84.—Can you give us the names of manufacturers of glass which is practically unbreakable.

Business Publications

"A Job That Took a Million Years" or "The Tale of the Clam," a 16-page pamphlet recently issued by The Ohio Hydrate & Supply Co., Woodville, O., is an interesting example of how a subject such as lime, usually considered commonplace, may be treated in an intensely interesting way. The booklet explains briefly Nature's processes in the formation of limestone, pictures the Company's Woodville quarries, and illustrates and describes the methods and processes which the raw material goes through in their modern mill in the course of its manufacture into high grade products containing less than half per cent impurities.

At the back of the booklet is a word of advice addressed to lime dealers but equally applicable to business men in any other line—"Continued silence and lack of animation finally results in ossification. He who stands silent and shouts not for his wares, is soon forgotten.

"In time, his own silence superinduces a drying up and hardening process, like unto the experience of the clam. And while Nature has seen fit to provide a way whereby the innocent clam can yet serve mankind, the human clam might not be so kindly favored.

"It is far better that all of us should raise our voices to proclaim the character of our goods and the quality of our service, that our fellow-men may benefit in the present here and now.

"Therefore be proud of the goods you have to offer. If you can't be proud of them, get a brand you can be proud of,—then persistently tell your story to the world. Under no circumstances keep silent. Remember, a clam eventually becomes a fossil. *Don't be a clam.*"

In 1921 The Ohio Hydrate & Supply Company erected a large addition to its plant and it is announced by Fred Witmer, general sales manager, that erection is now going on of a new ground lime plant for the purpose of producing at minimum cost a pulverized burnt lime for the glass trade. Mr. Witmer states that several glass manufacturers who have bought and tried out Ohio burnt lime report that on account of the small percentage of impurities contained, they find it especially desirable for use in glass.

Wiederholdt Chimneys.—A very handsome new 18-page catalog has been issued by the Wiederholt Construction Company, St. Louis, Mo., the greater part of which is devoted to the elucidation of the principles and methods underlying the construction of Wiederholdt chimneys, so well known and extensively used in modern glass factories. The different steps in the construction of a chimney are described, from laying the foundation to the starting of the wall and the final completion of the structure. Some space is given to a consideration of Wiederholdt cooling towers, storage bins and similar structures, and tables giving the commercial horse power for chimneys from 1 ft. 6 in. to 20 ft. in diameter, and from 50 to 300 ft. in height are included.

Low Pressure Air-Gas Inspirators.—Bulletin 3D. The Surface Combustion Company, Gerard avenue, Bronx, New York. Compares the low-pressure type of automatic inspirator as related to gas furnaces, to the carburetor of the automobile, which provides an automatic supply of air and gas in the proper proportions, mixes it homogeneously, and insures instantaneous combustion. The bulletin describes the equipment, explains its operation, gives instructions for ordering and other information.

Russell Engineering Company, St. Louis, Mo., glass furnace and factory engineers and constructors, recently issued a folder containing illustrations and a compilation of standard 9-inch brick shapes carried in stock by them.

Thwing Instrument Company, Philadelphia, Pa., Bulletin II, Thwing Radiation Pyrometers. A 16-page catalog illustrating and describing both indicating and recording types and giving the theory of operation.

Stock Quotations

(Reported by Moore, Leonard & Lynch, Frick Building, Pittsburgh, Pa.)

PITTSBURGH STOCK EXCHANGE—JULY 26, 1922.

	Bid	Asked	Last
American Window Glass Machine, com..	78¼	79	81
American Window Glass Machine, pfd..	..	..	90
American Window Glass, pfd.....	..	..	107
Pittsburgh Plate Glass.....	..	..	170
U. S. Glass	53	..	54

The past month witnessed a slight weakening in the price undertone of most of the glass issues. However, there have been no developments in the industry that would account for any reactions in the stocks and probably the weakness displayed has been due to the complex elements of the general industrial situation. Activity is increasing and practically all the glass-producing companies are running at a rate well above that which was anticipated several months ago.

WHEELING STOCK EXCHANGE—JULY 26, 1922.

	Bid	Asked	Last
Hazel-Atlas Glass	..	167	167
Imperial Glass	..	110	86
Fostoria Glass	116	..	116
Central Glass	100	..	115

A quiet market prevailed for the glass securities last month. Conditions in the industry have not changed during the past thirty days and practically all plants are running at capacity with orders coming in at satisfactory rates. To date the industry has felt no adverse effects from the present strikes and earnings are running along at a substantial rate.

TOLEDO STOCK EXCHANGE—JULY 26, 1922.

	Bid	Asked	Last
Owens Bottle Machine, com.....	34⅛	34¾	34⅛
Owens Bottle Machine, pfd.....	103½	105	105
Libbey Owens Sheet Glass, com.....	128	134	..
Libbey Owens Sheet Glass, pfd.....	102	107	..

Current Prices of Glass Making Materials

From quotations furnished by various manufacturers and dealers

July 27, 1922

	Carlots	Less Carlots
Aluminum hydrate ($Al(OH)_3$)..lb.	.05½	.06
Aluminum oxide (Al_2O_3).....lb.	..	..
Antimony oxide (Sb_2O_3).....lb.	.07–.08	.08
Arsenic trioxide (dense white), 99% (As_2O_3).....lb.	.08½	..
Barium carbonate ($BaCO_3$).....ton	58.00–60.00	70.00
Barium hydrate ($Ba(OH)_2$).....lb.	.05½	..
Bone ash .....lb.	.05	.06
Borax ($Na_2B_4O_7 10H_2O$).....lb.	.05¼–.05½	.05½–.06
Borax, fused, any mesh ($Na_2B_4O_7$)lb.	.19	.20
Boric acid, fused (B_2O_3).....lb.	.35	.35
Cadmium Sulphide, red (CdS)...lb.	..	1.60
Cadmium Sulphide, orange.....lb.	..	1.80
Cadmium Sulphide, yellow (CdS) lb.	..	1.80
Chrome Oxide .....lb.	.35	.36
Cobalt oxide, in bbls. (Co_2O_3)...lb.	..	2.00
Cobalt oxide, in 10 lb. tins (Co_2O_3) .....lb.	..	2.10
Copper oxide, red.....lb.	.16½	.17–.20
Copper oxide, black (CuO).....lb.	..	.26
Copper oxide, black prep'd (CuO)lb.	..	.30
Cryolite (Na_3AlF_6).....lb.	..	.09½
Feldspar, 100 mesh.....ton	15.00	..
Fluorspar, powdered white, 95% (CaF_2) .....ton	35.00	..
Fluorspar, powdered white, 90% (CaF_2) .....ton	33.00	38.00
Hydrofluoric acid (HF) 60%....lb.	.14	..
Kaolin .....ton	17.00	25.00
Lead oxide (red lead) (Pb_3O_4)..lb.	.09	.09–.09½
Litharge (PbO).....lb.	.08½	.08½
Lime—		
Hydrated (in 50 lb. paper sacks) ($Ca(OH)_2$) .....ton	10.50	..
Burnt, ground, in bulk (CaO).ton	7.25	..
Burnt, ground, in paper sacks.ton	9.25	..
Burnt, ground in 280 lb. bbls. per bbl, ...	2.00	2.05
Manganese 85% (MnO_2).....lb.	.04–.04½	.05–.06½
Nickel oxide, black (Ni_2O_3) for nickel content .....lb.	..	.50
Nickel monoxide, green (NiO) for nickel content .....lb.	..	.50
Potassium carbonate—		
Calcined 90% (K_2CO_3).....lb.	.06	..
Hydrated 90% (KOH).....lb.	.06½	.08
Potassium nitrate (KNO_3).....lb.	.06½–.08	.06¾–10¼
Powdered blue .....lb.	..	.24–.26
Powdered blue (std. formula)....lb.	..	.38
Salt cake, glassmakers, f. o. b. works (Na_2SO_4) .....ton	21.00	28.00–30.00
Selenium (Se) .....lb.	..	1.95–2.25
Soda ash, 58% dense, 48% basis		
Bulk (Na_2CO_3) .....100 lb.	1.22½	..
Bulk, on contract (Na_2CO_3) 100 lb.	1.17½	..
Sodium nitrate, refined ($NaNO_3$).lb.	.04½–.06	.04¾–.06¼
Sodium selenite (Na_2SeO_3).....lb.	..	2.35–3.00
Sodium Fluosilicate (Na_2SiF_6)..lb.	..	..
Sulphur (S) (flowers)—in bbls. per 100 lb.	3.35	3.65–3.90
Sulphur (flowers) Bags per 100 lb.	3.00	3.30–3.55
Sulphur (S) (flour, heavy), in bbls. per 100 lb.	2.25–2.50	2.55–3.05
Uranium oxide—100 lb. lots (UO_3) .....lb.	2.10	2.25–2.50
Zinc oxide (ZnO).....lb.	.07–.11	.07¾–.11

Monthly Summary of United States Foreign Commerce in Glass

Corrected to June 26, 1922

IMPORTS

	May				Eleven Months Ending May			
	1921		1922		1921		1922	
Glass and glassware:	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Bottles, vials, carboys, etc., plain, empty or filled lbs. .....dut.	558,935	$20,932	918,022	$27,873	7,624,177	$334,728	8,207,332	$317,044
Bottles, decanters and other glassware, cut or ornamented .....dut.	.....	107,342	.....	205,190	.....	1,462,261	.....	1,564,004
Optical instruments, including lenses and spectacles .....dut.	.....	135,383	.....	129,826	.....	1,045,170	.....	999,336
Sheet and plate glass—								
Cylinder, crown and common window glass, unpolished .....lbs. dut.	5,917,958	291,543	6,274,480	352,858	22,950,657	1,526,567	46,346,041	2,378,390
Plate glass, cast, polished, unsilvered, sq. ft. dut.	191,373	148,799	553,623	233,781	3,291,999	2,912,594	4,189,970	2,090,326
Plates or disks, rough cut, for optical purposes .....lbs. free	68,097	68,134	4,346	5,869	1,014,431	963,043	201,631	218,763
All other .....dut.	.....	179,203	.....	367,196	.....	2,403,775	.....	2,474,743
Total	.....	$951,336	.....	$1,322,593	.....	$10,648,128	.....	$10,042,606

EXPORTS

Glass and glass products (total).....	.....	$998,462	.....	$774,579	.....	$24,506,239	.....	$7,926,904
Plate and window glass—								
Window glass, common, box, 50 sq. ft.....	2,429	27,817	3,210	20,102	335.515	2,381,762	24,190	142,646
Exported to—								
Canada	94	$450	314	$6,494	141,932	$920,163	2,742	$24,093
Mexico	1,134	12,846	1,136	4,503	34,614	289,602	8,989	48,237
Cuba	945	12,598	660	3,392	31,869	252,264	4,989	24,773
Argentina	.....	.....	.....	.....	23,000	140,020	.....	.....
Brazil	.....	.....	2	13	17,362	120,067	4	33
Chile	.....	.....	.....	.....	7,928	51,773	61	793
Uruguay	.....	.....	.....	.....	13,556	87,616	.....	.....
China	.....	.....	2	11	5,135	38,429	44	571
Japan	.....	.....	.....	.....	10,411	85,157	1	15
Australia	.....	.....	.....	.....	6,955	48,829	14	98
New Zealand	.....	.....	.....	.....	944	9,100	13	125
Other countries	256	1,923	1,096	5,689	41,809	338,742	7,333	43,908
Plate glass, unsilvered, sq. ft.....	133,635	$77,564	297,019	$121,491	2,928,580	$2,127,851	2,262,396	$1,024,140
Wire glass, sq. ft.....	.....	.....	45,867	15,129	.....	.....	[1]132,737	[1]33,254
Other window and plate glass, n. e. s.....lbs.	.....	.....	210,523	18,772	.....	.....	[1]774,728	[1]77,553
Glass containers (bottles, vials and jars).....lbs.	.....	336,288	3,668,524	202,259	.....	7,564,222	.....	2,139,341
Table glassware, plain.....lbs.	.....	.....	1,043,748	116,401	.....	.....	[1]3,444,072	[1]429,599
Table and other glassware, cut or engraved....lbs.	.....	10,742	38,448	12,557	.....	329,119	.....	123,086
Glassware for lighting—								
Lamp chimneys and lantern globes.....lbs.	.....	.....	131,799	28,673	.....	.....	[1]553,111	[1]118,556
Globes and shades for lighting fixtures.....lbs.	.....	.....	137,776	43,300	.....	.....	[1]589,930	[1]174,352
Lamps and other illuminating devices, chiefly of glass .....lbs.	.....	.....	73,405	28,537	.....	.....	[1]508,226	[1]191,964
Chemical glassware .....lbs.	.....	24,019	52,637	22,518	.....	278,553	.....	155,773
Electrical glassware, except for lighting.....lbs.	.....	.....	189,585	10,246	.....	.....	[1]681,934	[1]70,358
Other glassware, n. e. s.....lbs.	.....	522,032	1,126,166	134,594	.....	11,824,732	.....	3,246,282

[1]Jan. 1 to May 31, 1922.